1) Improbable things happen all the time.

William Lane Craig writes: If you read the work of Intelligent Design theorists you'll find that none of them appeals to the simple high improbability of an event or thing as a basis for a design inference. Your own existence, for example, is due to the incredibly improbable union of a certain sperm and a certain egg, yet we would not infer on that basis that your conception was intelligently designed.

The dean of the contemporary Intelligent Design movement William Dembski argues that in addition to high improbability there also needs to be conformity to an independently given pattern. When these two elements are present, we have what Dembski calls "specified complexity," which is the tip-off to intelligent design. Thus, for example, in a poker game any deal of cards is equally and highly improbable, but if you find that every time a certain player deals he gets all four aces, you can bet this is not the result of chance but of design.

Now in your example, if the two rocks collided, you would infer neither design nor chance as the best explanation, but the third alternative, physical necessity. Since gravitation acts over infinite distances, it is actually inevitable that those two masses will eventually collide. What would warrant a design inference would be if the rocks were to break into pieces which then came together to spell "Welcome to the Milky Way."

To detect design look for high improbability conjoined with an independently given pattern.

So, while it is true that any universe is equally improbable, it is still true that any universe which exists is vastly more probable to be life-prohibiting rather than life-permitting, and since a life-permitting universe carries with it an independently given pattern, we are tipped off to design. Thus, contrary to popular opinion, we aren't asking why 'this' universe exists, rather, we are asking why a life-permitting universe exists. The correct analogy isn't a lottery then, instead, imagine a tub containing billions and billions of white ping pong balls with one black ping pong ball with one ping pong ball chosen at random. If the ball is white, then you will be shot. If the ball is black, then you will be able to live. Our universe is the black ball. Indeed, our universe is more like choosing the black ball at random five times in a row!

2) If the universe wasn't fine-tuned then we wouldn't be here. So, it is just a brute fact that we are here.

William Lane Craig writes: This assertion is either trivial or patently false. The sense in which the consequent is true, namely, we cannot observe a universe incompatible with our existence, is trivial and independent of the antecedent clause. From the fact that we can observe only life permitting universes, it doesn't follow that no explanation is needed for why the universe is life permitting. From the fact that you shouldn't be surprised to observe that you aren't dead, it

doesn't follow that you shouldn't be surprised that you do observe that you are alive; you shouldn't be surprised that you don't observe that you are dead because it is impossible to observe that, but it doesn't follow from that that you shouldn't be surprised that you do observe that you are alive in light of the enormous improbability that the universe is fine-tuned for life. To further illustrate this response, consider the following "firing-squad" analogy. As John Leslie (1988, p. 304) points out, if fifty sharp shooters all miss me, the response "if they had not missed me I wouldn't be here to consider the fact" is not adequate. Instead, I would naturally conclude that there was some reason why they all missed, such as that they never really intended to kill me. Why would I conclude this? Because my continued existence would be very improbable under the hypothesis that they missed me by chance, but not improbable under the hypothesis that there was some reason why they missed me. Thus, by the prime principle of confirmation, my continued existence strongly confirms the latter hypothesis.

But if this objector means to say that our observation of a highly improbable, fine-tuned universe is explained by a self-selection effect in a multi-verse, namely, that observers must observe the universe to be fine-tuned, then this assertion is false because observable worlds populated with Boltzmann brains have not been shown to be improbable, in which case we have no reason whatsoever to expect to find ourselves in a world in which we embodied, interactive agents can live.

Robin Collins writes: The response to this objection is to simply restate the argument in terms of our existence: our existence as embodied, intelligent beings is extremely unlikely under the atheistic single-universe hypothesis (since our existence requires fine-tuning), but not improbable under theism. Then, we simply apply the prime principle of confirmation to draw the conclusion that *our existence* strongly confirms theism over the atheistic single-universe hypothesis.

3) There is a multi-verse, or many-worlds ensemble of which we are the chance winners of the life-permitting universe lottery.

Robin Collins writes:
First Reason:

The first reason for rejecting the atheistic many-universes hypothesis, and preferring the theistic hypothesis, is the following general rule: *everything else being equal, we should prefer hypotheses for which we have independent evidence or that are natural extrapolations from what we already know.* Let's first illustrate and support this principle, and then apply it to the case of the fine-tuning.

Most of us take the existence of dinosaur bones to count as very strong evidence that dinosaurs existed in the past. But suppose a dinosaur skeptic claimed that she could explain the bones by

postulating a "dinosaur-bone-producing-field" that simply materialized the bones out of thin air. Moreover, suppose further that, to avoid objections such as that there are no known physical laws that would allow for such a mechanism, the dinosaur skeptic simply postulated that we have not yet discovered these laws or detected these fields. Surely, none of us would let this skeptical hypothesis deter us from inferring to the existence of dinosaurs. Why? Because although no one has directly observed dinosaurs, we do have experience of other animals leaving behind fossilized remains, and thus the dinosaur explanation is a *natural extrapolation* from our common experience. In contrast, to explain the dinosaur bones, the dinosaur skeptic has invented a set of physical laws, and a set of mechanisms that are *not* a natural extrapolation from anything we know or experience.

In the case of the fine-tuning, we already know that minds often produce fine-tuned devices, such as Swiss watches. Postulating God--a supermind--as the explanation of the fine-tuning, therefore, is a natural extrapolation from of what we already observe minds to do. In contrast, it is difficult to see how the atheistic many-universes hypothesis could be considered a natural extrapolation from what we observe. Moreover, unlike the atheistic many-universes hypothesis, we have some experiential evidence for the existence of God, namely religious experience. Thus, by the above principle, we should prefer the theistic explanation of the fine-tuning over the atheistic many-universes explanation, everything else being equal.

Second Reason:

A second reason for rejecting the atheistic many-universe hypothesis is that the "many-universes generator" seems like it would need to be designed. For instance, in all current worked-out proposals for what this "universe generator" could be--such as the oscillating big bang and the vacuum fluctuation models explained above--the "generator" itself is governed by a complex set of physical laws that allow it to produce the universes. It stands to reason, therefore, that if these laws were slightly different the generator probably would not be able to produce any universes that could sustain life. After all, even my bread machine has to be made just right in order to work properly, and it only produces loaves of bread, not universes! Or consider a device as simple as a mouse trap: it requires that all the parts, such as the spring and hammer, be arranged just right in order to function. It is doubtful, therefore, whether the atheistic many-universe theory can entirely eliminate the problem of design the atheist faces; rather, at least to some extent, it seems simply to move the problem of design up one level. (5)

Third Reason:

A third reason for rejecting the atheistic many-universes hypothesis is that the universe generator must not only select the parameters of physics at random, but must actually randomly create or select the very laws of physics themselves. This makes this hypothesis seem even more far-fetched since it is difficult to see what possible physical mechanism could select or create laws.

The reason the "many-universes generator" must randomly select the laws of physics is that, just as the right values for the parameters of physics are needed for life to occur, the right set of laws is also needed. If, for instance, certain laws of physics were missing, life would be impossible. For example, without the law of inertia, which guarantees that particles do not shoot off at high speeds, life would probably not be possible (Leslie, Universes, p. 59). Another example is the law of gravity: if masses did not attract each other, there would be no planets or stars, and once again it seems that life would be impossible. Yet another example is the *Pauli Exclusion Principle*, the principle of quantum mechanics that says that no two fermions--such as electrons or protons--can share the same quantum state. As prominent Princeton physicist Freeman Dyson points out [*Disturbing the Universe*, p. 251], without this principle all electrons would collapse into the nucleus and thus atoms would be impossible.

Fourth Reason:

The fourth reason for rejecting the atheistic many-universes hypothesis is that it cannot explain other features of the universe that seem to exhibit apparent design, whereas theism can. For example, many physicists, such as Albert Einstein, have observed that the basic laws of physics exhibit an extraordinary degree of beauty, elegance, harmony, and ingenuity. Nobel Prize winning physicist Steven Weinberg, for instance, devotes a whole chapter of his book Dreams of a Final Theory (Chapter 6, "Beautiful Theories") explaining how the criteria of beauty and elegance are commonly used to guide physicists in formulating the right laws. Indeed, one of most prominent theoretical physicists of this century, Paul Dirac, went so far as to claim that "it is more important to have beauty in one's equations than to have them fit experiment." (1963, p. ??).

Now such beauty, elegance, and ingenuity make sense if the universe was designed by God. Under the atheistic many-universes hypothesis, however, there is no reason to expect the fundamental laws to be elegant or beautiful. As theoretical physicist Paul Davies writes, "If nature is so 'clever' as to exploit mechanisms that amaze us with their ingenuity, is that not persuasive evidence for the existence of intelligent design behind the universe? If the world's finest minds can unravel only with difficulty the deeper workings of nature, how could it be supposed that those workings are merely a mindless accident, a product of blind chance?"

(Superforce, pp. 235-36.)

Fifth Reason

This brings us to the final reason for rejecting the atheistic many-universes hypothesis, which may be the most difficult to grasp: namely, neither the atheistic many-universes hypothesis (nor the atheistic single-universe hypothesis) can at present adequately account for the improbable initial arrangement of matter in the universe required by the second law of thermodynamics. To see this, note that according to the second law of thermodynamics, the entropy of the universe is constantly increasing. The standard way of understanding this entropy increase is to say that the universe is going from a state of order to disorder. We observe this entropy increase all the time around us: things, such as a child's bedroom, that start out highly organized tend to "decay" and become disorganized unless something or someone intervenes to stop it.

Now, for purposes of illustration, we could think of the universe as a scrabble-board that initially starts out in a highly ordered state in which all the letters are arranged to form words, but which keeps getting randomly shaken. Slowly, the board, like the universe, moves from a state of order to disorder. The problem for the atheist is to explain how the universe could have started out in a highly ordered state, since it is extraordinarily improbable for such states to occur by chance.(6) If, for example, one were to dump a bunch of letters at random on a scrabble-board, it would be very unlikely for most of them to form into words. At best, we would expect groups of letters to form into words in a few places on the board.

Now our question is, Could the atheistic many-universes hypothesis explain the high degree of initial order of our universe by claiming that given enough universes, eventually one will arise that is ordered and in which intelligent life occurs, and so it is no surprise that we find ourselves in an ordered universe? The problem with this explanation is that it is overwhelmingly more likely for local patches of order to form in one or two places than for the whole universe to be ordered, just as it is overwhelmingly more likely for a few words on the scrabble-board randomly to form words than for all the letters throughout the board randomly to form words. Thus, the overwhelming majority of universes in which intelligent life occurs will be ones in which the intelligent life will be surrounded by a small patch of order necessary for its existence, but in which the rest of the universe is disordered. Consequently, even under the atheistic many-universes hypothesis, it would still be enormously improbable for intelligent beings to find themselves in a universe such as ours which is highly ordered throughout. (See Sklar, chapter 8 for a review of the non-theistic explanations for the ordered arrangement of the universe and the severe difficulties they face.)

Sixth Reason:

The reliance on the observer selection principle brings up an enormous problem with the multiverse explanations of the fine-tuning: the fine-tuning data is not that we live in a "observer-structured universe," by which I mean a universe structured in such a way that a large number of observers will arise; rather, the data is that we exist in a universe that is precisely set so that the predominant kind of observers that are likely to occur are embodied conscious agents *that can significantly affect each other's welfare, either for good or ill*. . . . The B[oltzmann] B[rain] problem, therefore, shows that the constants are not fine-tuned for observers, but rather for interacting agents that arise through a standard evolutionary process. Yet, because of its reliance on the observer-selection principle, the multiverse hypothesis could at best explain fine-tuning for the existence of observers, not fine-tuning for interacting agents.

Seventh Reason,

William Lane Craig writes:

So what about the alternative of chance? This is the "multiple universe" hypothesis mentioned by Carrier. The multiple universe hypothesis is essentially an effort on the part of partisans of chance to multiply their probabilistic resources in order to reduce the improbability of the occurrence of fine-tuning. (The more spins of the roulette wheel, the better the chances of your number coming up!) The very fact that otherwise sober scientists must resort to such a remarkable hypothesis is a sort of backhanded compliment to the design hypothesis. It shows that the fine-tuning does cry out for explanation. But is the multiple universe hypothesis as plausible as the design hypothesis?

I'm not at all impressed by Carrier's appeal to familiarity as an argument for preferring the multiple universe hypothesis. For we have no experience whatsoever of other universes—the multiple universe hypothesis is a bold venture in metaphysical cosmology. Our familiarity with our universe does nothing to warrant the appeal to other universes as familiar entities—at least not more so than the design hypothesis. For while we are likewise not familiar with designers of universes, we certainly are familiar with minds and the products of intelligent design, so that the appeal to a designer as the best explanation of the fine-tuning is an appeal to a familiar explanatory entity. Indeed, theists have sometimes been accused of anthropomorphism in this regard!

Moreover, while we have no evidence of the existence of multiple universes, we do have independent reasons for believing in the existence of an ultramundane designer of the universe, namely, the other arguments for the existence of God, which I have defended elsewhere.

Finally, Carrier is mistaken when he opines that we cannot know that multiple universes do not exist and therefore agnosticism is the only justified conclusion. (Interesting to compare this conclusion with the frequent atheist claim that in the absence of evidence for God we should conclude that God does *not* exist! Do you see the inconsistency?) He is unaware of the potentially lethal objections to the multiple universe hypothesis that have been lodged by physicists like Roger Penrose of Oxford University (*The Road to Reality* [New York: Alfred A. Knopf, 2005], pp. 762-5). Simply stated, if our universe is but one member of an infinite world ensemble of randomly varying universes, then it is overwhelmingly more probable that we should be observing a much different universe than that which we in fact observe.

Penrose calculates that the odds of our universe's low entropy condition obtaining by chance alone are on the order of 1:1010(123), an inconceivable number. The odds of our solar system's being formed instantly by random collisions of particles is, on the other hand, about 1:1010(60), a vast number, but inconceivably smaller than 1010(123). Penrose calls it "chicken feed" by comparison! So if our universe were but one member of a collection of randomly ordered worlds, then it is vastly more probable that we should be observing a much smaller universe. Observable universes like that are much more plenteous in the ensemble of universes than worlds like ours and, therefore, ought to be observed by us if the universe were but one random member of an ensemble of worlds.

Or again, if our universe is but one random member of a world ensemble, then we ought to be observing highly extraordinary events, like horses' popping into and out of existence by random collisions, or perpetual motion machines, since these are vastly more probable than all of nature's constants and quantities falling by chance into the virtually infinitesimal life-permitting range. Since we do not have such observations, that fact strongly disconfirms the multiple universe hypothesis. Penrose concludes that multiple universe explanations are so "impotent" that it is actually "misconceived" to appeal to them to explain the special features of the universe.

Moreover, the world-ensemble is very ad hoc in that it is asking us to imagine not only that there are other universes, but an INFINITE NUMBER of other universes, and not only that there are other such universes, but that they are also all randomly ordered in their constants and quantities in order for life to appear by chance somewhere in the world ensemble. The fact that scientists are flocking to the multi-verse to explain the fine-tuning is really a back-handed compliment to the design hypothesis.

It gets worse than that though, because the many-worlds ensemble needs a mechanism that will generate universes that are randomly ordered which itself may very likely need to be fine-tuned. The candidate mechanisms that generate the many-worlds are so vague and few in number that it is far from likely that such a mechanism will be free of fine-tuning. For example, if M-theory is

what governs the multiverse, then it remains unexplained why there is exactly 11 dimensions.

Is there any evidence that such an ensemble of worlds exists? Recall that the BGV theorem applies to the multiverse as well which means that the mechanism which has been generating universes has only been operating for a finite time, which strongly undercuts any confidence that the many-worlds generator has been chugging along long enough to account for the fine-tuning of our universe by chance alone.

But if this objector means to say that our observation of a highly improbable, fine-tuned universe is explained by a self-selection effect in a multi-verse, namely, that observers must observe the universe to be fine-tuned, then this assertion is false because observable worlds populated with Boltzmann brains have been shown to be more probable than large orderly universes, in which case we have no reason whatsoever to expect to find ourselves in a world in which we embodied, interactive agents can live.

4) This argument is guilty of life-chauvinism; that is, why think that the universe is fine-tuned for life as compared to being fine-tuned for ipods, or bacteria, or star dust?

The fine-tuning argument seems to arbitrarily or chauvinistically pick out life as something that an intelligent designer would prefer over a lifeless universe, or one with pure hydrogen, or what have you. There are at least three reasons however that singling out the fine-tuning for the optimal evolution of embodied moral agents is not arbitrary, or chauvinistic, and is indeed something that confirms theism over atheism.

First, embodied moral agents have intrinsic worth. This means that an intelligent designer would prefer a universe with moral agents in it since it would be more valuable than any universe without them, and thus is to be expected of itself on theism, but not on atheism.

Second, even if you reject the claim that embodied moral agents have intrinsic worth, such agents are to be expected on the hypothesis of Christian theism of itself since such agents are made to be in relationship with such a designer, and stand at the center of the designer's purpose.

Third, even if you don't believe in objective moral values, and that we cannot know the intentions of the designer, the nature of the fine-tuning argument is cumulative. Many people seem to forget that it isn't just the fine-tuning, but also the beauty, elegance, intelligibility, and discoverability of the laws of nature, the constants and their relative strengths, and certain arbitrary boundary conditions, and mathematical representations therein that cumulatively give theism greater explanatory power than atheism.

Fourth, William Lane Craig writes: It seems to me that the question of why we should single out (intelligent) life as an instance of fine-tuning may be less important for some versions of the

teleological argument than for others. Take, for example, a version of the argument such as Robin Collins presents in our *Blackwell Companion to Natural Theology* formulated along Bayesian lines in terms of the probability calculus. Letting "FT" represent the fine-tuning of the universe for intelligent life, "T" represent theism, and "ASU" represent the atheistic single universe hypothesis (*i.e.*, there is a single universe and no God), Collins argues that the fine-tuning is significantly more probable on theism that it is on atheism: Pr (FT/T) >> Pr (FT/ASU). Therefore, the observed fine-tuning confirms the hypothesis of theism.

On this version of the argument, it doesn't seem that your question is especially pressing. We can calculate the probabilities of other observations as well to see if they similarly confirm theism. Take rainbow planets with fiery rings (X3). Is Pr (X3/T) >> Pr (X3/ASU)? It doesn't seem like it. There's no reason to think that Pr (X3/T) is very high or that Pr (X3/ASU) is very low—unless you're thinking it to be naturally impossible, in which case such a miraculous phenomenon would be evidence of theism. —similarly, for X2, singing gas, whatever you mean by that! So it seems to me that on a Bayesian approach, one can plug in any sort of observation we have and ask if it's more probable on theism than on atheism, and if it is, then it confirms theism. Computing the comparative probabilities of the fine-tuning of the universe for intelligent life would be a natural thing to do, given that we are intelligent, living beings.

Moreover, this objection presupposes that in order to recognize design, we have to assume that something has intrinsic worth, or even that we need independent access to the motives, goals, and abilities of the designer, but this is clearly false. First, we are clearly able to recognize cases of design even if we do not consider the object of the design to have intrinsic worth, and we can recognize design even if we do not have independent access to the motives and intentions of the designer; for example: The **Antikythera mechanism,**

Or one could simply modify the claim that the universe is fine-tuned for life to say instead: the universe is fine-tuned for the fitness of life, or as Paul Davies has said, "...the conclusion is not so much that the universe is fine-tuned for life; rather it is fine-tuned for the building blocks and environments that life requires." For a defense of this position read the following article by Neil A. Manson: http://home.olemiss.edu/~namanson/Anthropocentrism.pdf

5) String-theory provides a plausible candidate to show that is it physically necessary that any universe be fine-tuned for the existence of life.

William Lane Craig writes: First, the “cosmic landscape” of 10^500 different possible universes consistent with nature’s laws which M-Theory allows are just that: possibilities. They are not real worlds, anymore than are Feynman’s histories. So, even on M-Theory, a life-permitting isn't physically necessary because almost all of the 10^500 possible universes are life-prohibiting, so a different explanation would still be required as to why a life-permitting universe exists.

Second, it's not clear that 10^500 possibilities are sufficient to guarantee the existence of finely tuned universes in the landscape. What if the probability of fine tuning is less than 1:10^500? This may be especially problematic concerning the arbitrary initial conditions. Finally, does the multiverse itself described by M-Theory exhibit fine-tuning? If it does, then the problem has only been pushed back a notch. It seems that it does, for as Hawking and Mlodinow note, M-Theory requires precisely eleven dimensions if it is to be viable, and yet the theory cannot account for why just that number of dimensions should exist.

Moreover, Mlodinow and Hawking do not even mention, much less respond to, Roger Penrose's trenchant criticism of the Many Worlds Hypothesis for explaining fine-tuning in his *The Road to Reality*, namely, that if we were just a random member of a World Ensemble, then it is incomprehensibly more probable that we should be observing a much different universe than what we do, which strongly disconfirms the Many Worlds Hypothesis. There's no excuse for Hawking's failure to respond to his erstwhile collaborator's criticisms of Hawking's view.

6) Probabilities are always comparative, so how can we calculate the prior probability of life permitting universes when our sample space is only 1.

Robin Collins writes:
Classical Probability

The *classical conception of probability* defines probability in terms of the ratio of number of "favorable cases" to the total number of equipossible cases. (See Weatherford, chapter 2.) Thus, for instance, to say the probability of a die coming up "4" is 1/6 is simply to say that the number of ways a die could come up "4" is 1/6 the number of equipossible ways it could come up. Extending the this definition to the continuous case, classical probability can be defined in terms of the relevant ratio of ranges, areas, or volumes over which the principle of indifference applies. Thus, under this extended definition, to say that the probability of the parameters of physics falling into the life-permitting value is very improbable simply *means* that the ratio of life-permitting values to the range of possible values is very, very small. Finally, notice that this definition of probability implies the principle of indifference, and thus we can be certain that the principle of indifference holds for classical probability.

Epistemic Probability

Epistemic probability is a widely-recognized type of probability that applies to claims, statements, and hypotheses--that is, what philosophers call *propositions*. (12) Roughly, the epistemic probability of a proposition can be thought of as the degree of credence--that is, degree

of confidence or belief--we rationally should have in the proposition. Put differently, epistemic probability is a measure of our rational degree of belief under a condition of ignorance concerning whether a proposition is true or false. For example, when one says that the special theory of relativity is probably true, one is making a statement of epistemic probability. After all, the theory is actually either true or false. But, we do not know for sure whether it is true or false, so we say it is probably true to indicate that we should put more confidence in its being true than in its being false. It is also commonly argued that the probability of a coin toss is best understood as a case of epistemic probability. Since the side the coin will land on is determined by the laws of physics, it is argued that our assignment of probability is simply a measure of our rational expectations concerning which side the coin will land on.

Besides epistemic probability simpliciter, philosophers also speak of what is known as the *conditional* epistemic probability of one proposition on another. (A proposition is any claim, assertion, statement, or hypothesis about the world). The conditional epistemic probability of a proposition *R* on another proposition *S*--written as P(R/S)--can be defined as the degree to which the proposition *S of itself* should rationally lead us to expect that *R* is true. For example, there is a high conditional probability that it will rain today on the hypothesis that the weatherman has predicted a 100% chance of rain, whereas there is a low conditional probability that it will rain today on the hypothesis that the weatherman has predicted only a 2% chance of rain. That is, the hypothesis that the weatherman has predicted a 100% chance of rain today should strongly lead us to expect that it will rain, whereas the hypothesis that the weatherman has predicted a 2% should lead us to expect that it will not rain. Under the epistemic conception of probability, therefore, the statement that *the fine-tuning of the Cosmos is very improbable under the atheistic single-universe hypothesis* makes perfect sense: it is to be understood as making a statement about the degree to which the atheistic single-universe hypothesis would or should, *of itself*, rationally lead us to expect the cosmic fine-tuning.

Isn't this kind of probability to subjective though? Well, there is an element of subjectivity to it, but what is wrong with that? Moreover, as Collins points out: "let me say a few words about the advantages of using PPC. To begin with, it is practically uncontroversial. So, it is a principle that all sides can agree upon. Second, many
philosophers think that this principle can be derived, via Bayes's theorem, from what is known as the probability calculus, the set of mathematical rules that are typically assumed to govern probability. Third, there does not appear to be any case of recognizably good reasoning that violates this principle. Fourth, as mentioned above, the principle allows one to assess the degree to which we are justified in inferring to design, instead of such an inference being an all or nothing affair, and it accounts for the need for a partially subjective determination of the initial plausibility of the non-chance hypotheses. These are both features of how chance is eliminated and design is inferred in ordinary life. Finally, the principle appears to have a wide range of applicability, undergirding much of our reasoning in science

and everyday life, as the examples above illustrate. Indeed, some have even claimed that a slightly more general version of this principle undergirds all cases of confirmation in science.

7) The universe isn't very fine-tuned for life because it looks like most of the universe is actually hostile to life. Thus, God, if He fine-tuned the universe would have created a universe to human scale.

SEE MY RESPONSE TO EVERITT'S ARGUMENT FROM SCALE UNDER MY MORE ARGUMENTS AGAINST CHRISTIAN THEISM SECTION UNDER PHIL. OF RELIGION.

8) The cosmological constant isn't very fine-tuned because if it was closer to zero, then life on this planet would actually be able to last longer compared to the strength that it actually has.

William Lane Craig writes: As for the cosmological constant, what Prof. Krauss fails to appreciate is that that constant exhibits what Robin Collins calls “one-sided” fine-tuning, that it is say, while it may be decreased without detriment to life, it cannot be much increased without catastrophe. It is exquisitely fine-tuned for intelligent, interactive agents in that its life-permitting range is unfathomably tiny compared to its range of possible values.

Krauss also fails to take into consideration that although a cosmological constant closer to zero would extend our lives now, in the initial expansion of the universe, a cosmological constant loser to zero would have prevented a life permitting universe to exist as it does now.

Moreover, as Robin Collins points out, there is a tradeoff between the fine-tuning for life qua life, and the fine-tuning for making discoveries about the universe itself. So, while the cosmological constant could be tweaked as Krauss states, our ability to make scientific discoveries would have been completely hampered if the cosmological constant were as Krauss suggests.

9) Why think that a different form of life wouldn't thrive if the laws and or constants of the laws of nature were different? Life as we know it isn't life as it could be under a different laws of nature.

Robin Collins: Another objection people commonly raise to the fine-tuning argument is that as far as we know, other forms of life could exist even if the parameters of physics were different. So, it is claimed, the fine-tuning argument ends up presupposing that all forms of intelligent life must be like us. The answer to this objection is that most cases of fine-tuning do not make this presupposition. Consider, for instance, the case of the fine-tuning of the strong nuclear force. If it were slightly larger or smaller, no atoms could exist other than hydrogen. Contrary to what one might see on *Star Trek*, an intelligent life form cannot be composed merely of hydrogen gas:

there is simply not enough stable complexity. So, in general the fine-tuning argument merely presupposes that intelligent life requires some degree of stable, reproducible organized complexity. This is certainly a very reasonable assumption.

William Lane Craig writes, "In dealing with fine-tuning we are not concerned with the loci of *all possible* life forms, but only with loci governed by *the same laws of nature* as ours (but with different values of the constants and quantities). That is why we can predict what the world would be like if the values of the constants and quantities were slightly altered. And the point is that almost all such worlds are bereft of intelligent, interactive agents, so that a world chosen randomly from the ensemble of worlds has no meaningful chance of being life-permitting." For example, imagine a solitary fly resting on a large blank area of the wall. Suppose a single random shot is fired, and the bullet pierces the fly so that even if the area outside the wall is covered with flies so that a randomly fired bullet would probably strike a fly, nevertheless, it still remains highly improbable that within the large blank area that a randomly fired bullet would strike fly. It is vastly more probable that a bullet would hit some place in the blank area. So, if the shot does strike the fly, then it is probable that the aim of the bullet is not the result of chance, but design. Let our universe be like the fly, and the large blank area will be filled with other possible universes described by the same laws of nature as ours, but with different constants and quantities and what you find is that they are all life prohibiting, and this is true even if there are universes outside the large blank area that are governed by different laws of nature and exhibit fine-tuning because it would still be highly probable that a universe governed by our laws of nature would be life-prohibiting rather than life permitting.

10) Inflationary theory provides a naturalistic explanation of many significant features of fine-tuning, so God isn't needed.

William Lane Craig writes: But as Roger Penrose has insisted, any such explanation is "misconceived," since the second law of thermodynamics will require that whatever condition existed prior to inflation in a single universe scenario will have a lower entropy than the post inflation phase, Penrose has calculated that in the absence of new physical principles to explain this, "the accuracy of the Creator's aim" when he selected this world from the set of physically possible ones would need to have been at least of the order of one part in 1010(123)!and in a multiverse scenario one must deal with the "invasion of the Boltzmann brains," an objection which I pressed in the debate and on which Dr. Krauss was strangely and noticeably silent.

More importantly, however, inflationary scenarios seem to require the same sort of fine-tuning which some theorists thought these models had eliminated. For example, in order to proceed appropriately, inflation requires that the two theoretical components of Einstein's cosmological constant, "bare lambda" and "quantum lambda," cancel each other out with an enormously precise though inexplicable accuracy. A change in the strengths of either aG or aw by as little as

one part in 10^100 would destroy this cancellation on which our lives depend. So although inflationary models may succeed in providing a unifying explanation of some of the forces which play a role in classical cosmology, it does not thereby dispense with the appearance of fine-tuning or teleology.

Moreover, there are several other conditions of fine-tuning that inflation doesn't explain such as the strong and weak nuclear force, Pauli exclusion principle, etc.

11) Who Designed the Designer objection?

William Lane Craig writes, "This rejoinder is flawed on at least two counts. First, in order to recognize an explanation as the best, one needn't have an explanation of the explanation. This is an elementary point concerning inference to the best explanation as practiced in the philosophy of science. If archaeologists digging in the earth were to discover things looking like arrowheads and hatchet heads and pottery shards, they would be justified in inferring that these artifacts are not the chance result of sedimentation and metamorphosis, but products of some unknown group of people, even though they had no explanation of who these people were or where they came from. Similarly, if astronauts were to come upon a pile of machinery on the back side of the moon, they would be justified in inferring that it was the product of intelligent, extra-terrestrial agents, even if they had no idea whatsoever who these extra-terrestrial agents were or how they got there. In order to recognize an explanation as the best, one needn't be able to explain the explanation. In fact, so requiring would lead to an infinite regress of explanations, so that nothing could ever be explained and science would be destroyed. So in the case at hand, in order to recognize that intelligent design is the best explanation of the appearance of design in the universe, one needn't be able to explain the designer.

Secondly, Dawkins thinks that in the case of a divine designer of the universe, the designer is just as complex as the thing to be explained, so that no explanatory advance is made. This objection raises all sorts of questions about the role played by simplicity in assessing competing explanations; for example, how simplicity is to be weighted in comparison with other criteria like explanatory power, explanatory scope, and so forth. But leave those questions aside. Dawkins' fundamental mistake lies in his assumption that a divine designer is an entity comparable in complexity to the universe. As an unembodied mind, God is a remarkably simple entity. As a non-physical entity, a mind is not composed of parts, and its salient properties, like self-consciousness, rationality, and volition, are essential to it. In contrast to the contingent and variegated universe with all its inexplicable quantities and constants, a divine mind is startlingly simple. Certainly such a mind may have complex ideas—it may be thinking, for example, of the infinitesimal calculus—, but the mind itself is a remarkably simple entity. Dawkins has evidently confused a mind's ideas, which may, indeed, be complex, with a mind itself, which is an incredibly simple entity. Therefore, postulating a divine mind behind the universe most definitely

does represent an advance in simplicity, for whatever that is worth."

Robin Collins writes: The first response to the above atheist objection is to point out that the atheist claim that the designer of an artifact must be as complex as the artifact designed is certainly not obvious. But I do believe that their claim has some intuitive plausibility: for example, in the world we experience, organized complexity seems only to be produced by systems that already possess it, such as the human brain/mind, a factory, or an organisms' biological parent.

The second, and better, response is to point out that, at most, the atheist objection only works against a version of the design argument that claims that all organized complexity needs an explanation, and that God is the best explanation of the organized complexity found in the world. The version of the argument I presented against the atheistic single-universe hypothesis, however, only required that the fine-tuning be more probable under theism than under the atheistic single-universe hypothesis. But this requirement is still met even if God exhibits tremendous internal complexity, far exceeding that of the universe. Thus, even if we were to grant the atheist assumption that the designer of an artifact must be as complex as the artifact, the fine-tuning would still give us strong reasons to prefer theism over the atheistic single-universe hypothesis.

To illustrate, consider the example of the "biosphere" on Mars presented at the beginning of this paper. As mentioned above, the existence of the biosphere would be much more probable under the hypothesis that intelligent life once visited Mars than under the chance hypothesis. Thus, by the prime principle of confirmation, the existence of such a "biosphere" would constitute strong evidence that intelligent, extraterrestrial life had once been on Mars, even though this alien life would most likely have to be much more complex than the "biosphere" itself.

12) Testing the design hypothesis requires that we have information about the goals and abilities the designer would have; but we do not have that information in the design argument.

http://www.lydiamcgrew.com/PhiloTestability.pdf

13) The fine-tuning argument relies on meaningless probabilities since the values of the constants involve infinite quantities in the upward direction (strong nuclear force, speed of light, etc.) and therefore, they can't be normalized, but normalizability is necessary to make probability judgments.

Robin Collins will define a range that is finite, for the range of possible values, and what he points out is that certain forces of nature, that are the subject of fine-tuning, cannot be increased or decreased infinitely, they can go down to zero, or up to some finite value, but then they can't get any stronger. For example, once gravitation reaches a certain strength, then it becomes

physically impossible for it to get any stronger because any universe would just collapse into a singularity. Thus, the fine-tuning argument is based on what is physically possible, not what is logically possible. The range of physically possible values that the constants can take is finite, but the life-permitting range of those finite values is incredibly tiny. This way, you don't have to worry about normalizability because you wouldn't be using infinite quantities anymore.

http://appearedtoblogly.files.wordpress.com/2011/05/normalizabilityff2.pdf

14) Stenger's Monkey God Challenge

Victor Stenger's Monkey God Challenge

RESPONSE: (Taken from Robin Collins):

"The first criticism is that he doesn't address whether these universes would have other life-inhibiting features relative to ours. For example, if one decreases the strength of the strong nuclear force by more than 50 percent (while keeping the electromagnetic force constant), carbon becomes unstable, and with a slightly greater decrease, no atoms with atomic number greater than hydrogen can exist. This would make it virtually impossible for complex life to evolve. That Stenger ignores these other life-inhibiting features is clear from his equation for the lifetime of a star (which is unaffected by changes in the strong nuclear force, since none of the parameter he uses depends on this strength).

Second, the equation he uses is based on a simple star model of stellar evolution. The equation doesn't take into account the complexities of a stellar, such as whether the energy transport from the center of the star to the surface is by convection or radiative diffusion. More importantly, it assumes that the star is made mostly of hydrogen, which wouldn't be the case if the strong nuclear force were increased by a small amount. Furthemore, it doesn't take into account the effects on star stability of quantum degeneracy, which require much more sophisticated codes to take into account. As I have shown elsewhere, using a simple star model, one can increase the strength of gravity a million or billion fold, and still obtain stable, long lived stars around the same surface temperature as our Sun. However, when one takes into account quantum degeneracy effects, one can only increase the strength of gravity around a thousand fold before significantly decreasing the lifetime of stars. In sum, life-prohibiting effects related to stellar lifetimes only come to light when one begins to consider the complexity of the physics involved in stellar evolution, something Stenger hasn't done."

Third, stable star evolution has to go on for at least 9 billion years before the materials required for a habitable solar and planetary system exist, but only half of the stars in Stenger's last for more than 10 billion years.

Fourth, even though a 3000 fold increase sounds like a lot, relative to the full range of strengths that we see exhibited in the constants of the laws of nature, such a life-permitting range is still very tiny.

15) How are these improbabilities calculated? Are they arbitrary?

William Lane Craig: "In order to calculate the probability of a constant's being such that it leads to a life-supporting universe, we need to calculate the ratio between the range of life-permitting values and the range of values it might have, whether life-permitting or not. We can assess the range of life-permitting values by holding the laws of nature constant while altering the value of the constant which plays a role in that law. So, for example, we can figure out what would happen if we decrease or increase the force of gravity, and we discover that alterations beyond a certain range would result either in large-scale objects' ceasing to stick together or else collapsing. That will give us an idea of the range of strength of the gravitational force that is compatible with physical life forms. Then we compare that range with the range of values that the constant could have assumed. This is trickier, but a simple rule of thumb is to take the range to be as wide as we can see that such values are possible. There may be values that a constant could have which lie outside our ken, but so long as the range that we can see is large in comparison to the life-permitting range, then that constant's having the value it does is improbable. For some of the constants, like the cosmological constant, the range of life permitting values is incomprehensibly tiny in comparison with the range of values we see that it could have, so that the chances of the constant's having the value it does is virtually next to impossible.

The range itself is not fine-tuned. Rather it is the individual constant that is fine-tuned, that is to say, in order for the universe to be life-permitting the constant must fall into a very narrow life-permitting range in comparison to the range of values it could have assumed."

16) Didn't Victor Stenger disprove that the universe is fine-tuned in his 2011 book, *The Fallacy of Fine-Tuning*; despite the fact that the majority view in contemporary physics is that the universe is fine-tuned?

Absolutely not! Here is a link to an in-depth and very professional response to the main claims in Victor Stenger's book by Luke Barnes:
http://arxiv.org/PS_cache/arxiv/pdf/1112/1112.4647v1.pdf

http://home.messiah.edu/~rcollins/Fine-tuning/Stenger-fallacy.pdf

17) Does the following article provide evidence of a multi-verse:

http://authors.library.caltech.edu/11111/1/AGUprd08.pdf ?

RESPONSE BY LUKE BARNES: I don't think that the paper is particularly relevant to fine-tuning. They present a scenario for bubble collisions, but they are only concerned with finding the equations that describe them. There is no direct empirical evidence for such an event in our past, though it is a very interesting idea. At most, this could be one way for the inflationary universe to create more life-permitting regions. Even if we did observe the aftermath of a bubble collision, it wouldn't prove the existence of a multiverse as we would only have seen the intersection of two bubbles.

18) What about the problem of Old Evidence?

Luke Barnes: A few responses:

* I'm not convinced that there is such a thing as the problem of old evidence. I'm yet to see a presentation of it that wasn't just a misapplication of Bayes theorem.

* A minor point ... "there are many possible universes similar to ours in certain ways, and yet not life-permitting". Fine-tuning tries to look at the set of possible universes, so they are similar to ours only in the sense that we use the laws of nature in our universe as a starting point.

* What we really want to know is:
P(G|E) = probability of God's existence given all the evidence.

Given all the other evidence E', what effect does adding the fine-tuning of the universe F to the total evidence (E = E'&F) have on the probability: (~G = not G)

P(G|E) = P(G|E'&F)
= P(F|G&E') P(G&E') / [P(F|G&E') P(G&E') + P(F|~G&E') P(~G&E')]

So saying "I already knew that our universe was special" ... yeah, but how special? I don't think anyone expected life-permitting-ness to be so sensitive to fundamental parameters. In terms of the formula above, modern fine-tuning evidence can show that P(F|~G&E') is much smaller than we would have guessed a few decades ago. The last sentence of the quote isn't true. Assuming that "the universe is special" implies that P(F|~G&E') is small, then showing that P(F|~G&E') is even smaller than we thought doesn't change the fact that the universe is special, but it does change the probability for the existence of God.

Also, the success or failure of the argument depends on the truth of the premises (or the values assigned to the relevant probabilities), not on when we learned them. If all modern fine-tuning did was bring into clear focus a fact which should have been realized in the Middle ages, then all that follows is

that if the fine-tuning argument works today, then it would have worked in the Middles Ages as well. It doesn't show that the argument fails.

Tim McGrew: Hmm. I'm in a bit of a difficult position here, because I think there *are* problems with the way the FTA is generally presented. Still, this way of ducking the issue seems to me like saying this:

"Before I discovered that the members of a firing squad in a semicircle just tried to eliminate me but all missed, I already knew that I was alive. Discovering that they were all shooting and all missed doesn't change that. Therefore, the fact that I'm now alive doesn't call for any special explanation."

And that *has* to be wrong, whether the evidence is old or not. The *significance* of the evidence has changed.