

## SECTION I

### QUESTIONS 1-20; MULTIPLE CHOICE

1 point for each right answer, for a total of 20 points. (There is no penalty for wrong answers.)

#### **Instructions:**

A separate 1-page answer sheet accompanies this question paper. Record your answers in the blank spaces on the answer sheet. Answer by writing one letter (a-e) per question. Illegible or ambiguous answers will receive no credit.

Remember to write your matriculation number on the answer sheet; do not write your name on the answer sheet.

Passage 1, from Plato's *Euthyphro*:

S: It is of paramount importance, then, for me to matriculate as your student, admirable Euthyphro, so as to be able to rebut Meletus concerning this indictment of his, which is all about these very things. Then would I say to him that in the past I too exalted knowledge of divinity above all else, and now that I stand guilty of divine improvisations and fabrications, I have enrolled myself as your pupil. I would say to him: 'Meletus, if you grant that Euthyphro is wise in these matters, then grant that I too have all the true beliefs, and don't drag me into court. If you don't grant it, sue my teacher, not me, for corrupting the old – me and his father – through teachings, exhortations, and legal actions.' If that doesn't do the trick, if he doesn't drop the charge, or else pin it on you instead of me, I'll try out the same line in court. (pdf, p. 3)

#### QUESTION 1

In passage 1, Socrates cites which of the following as grounds for enrolling as Euthyphro's student?

- A) If he does so, he will be able to respond to Meletus' charges.
- B) If Euthyphro's views about divinity are true, Socrates can claim to have the same beliefs.
- C) If Euthyphro's views about divinity are false, Socrates will not be prosecuted for corrupting the young; rather, Euthyphro will be prosecuted for corrupting the old.
- D) Socrates can argue both B and C before both Meletus and in court. And if either Meletus or the jury accepts them, Socrates will not be convicted.
- E) All of A-D.

Passage 2, from Plato's *Euthyphro*:

S: Well now, Euthyphro, have you ever heard any man arguing that one who has murdered or otherwise acted unjustly should not pay the penalty?

E: There are endless disputes about this sort of thing, both in and out of the courts, because wrongdoers will say and do anything to avoid getting punished.

S: Do they admit they have done wrong, Euthyphro, but maintain that, even so, they should not be punished?

E: No, they don't admit it.

S: So then they don't say or do just anything. For they don't go so far as to admit this, nor do they go so far as to deny they should pay the penalty if they did wrong. But I think they do deny wrong-doing, don't they?

E: That's how it is.

S: Then they don't dispute that wrongdoers must be punished, only who did wrong, what they did, and when.

E: You are right. (pdf, p. 7)

## QUESTION 2

The point Socrates is making in passage 2 is most analogous to which of the following?

- A) Scientists may argue about which theory is best. But they never dispute that the best theory should be accepted.
- B) All arguments about justice and injustice – about murder, for example – are merely disagreements about the meanings of words.
- C) If you call something 'a rose', then it is a rose by definition. If you call something 'murder', it is murder by definition.
- D) All scientists agree that the best theory should be accepted. From the fact that they nevertheless disagree about what the best theory is, it follows that there is no best theory.
- E) All scientists dispute that the best theory should be accepted. And, since there is no theory that is in fact accepted by everyone, it follows that no theory is best.

Passage 3, from Plato's *Meno*:

M: It's really not that hard to say, Socrates. First, if you want the virtue of a man, it is easy to say that a man's virtue consists in being able to manage public affairs and thereby help his friends and harm his enemies – all the while being careful to come to no harm himself. If you want the virtue of a woman, it's not difficult to describe: she must manage the home well, keep the household together, and be submissive to her husband; the virtue of a child, whether boy or girl, is another thing altogether, and so is that of an elderly man – if you want that – or if you want that of a free man or a slave. There are lots of different virtues, as a result of which it is not at all hard to say what virtue is. There is virtue for every action and every stage in life, for every person and every capacity, Socrates. And the same goes for wickedness.

S: It must be my lucky day, Meno! Here I was, looking for just one virtue, and you happen by with a whole swarm! But, Meno, following up on this figurative swarm of mine, if I were to ask you what sort of being a bee is, and you said, 'there are all sorts of different sorts of bees,' what would you say if I went on to ask: 'Do you mean that there are all sorts of different sorts of bees insofar as they are bees? Or are they no different, insofar as they are bees, but they differ in other respects – in how beautiful they are, for example, or how big, and so on and so forth?' Tell me, what would you answer if I asked you this? (pdf, p. 2)

### QUESTION 3

Which of the following is the best statement of Socrates' complaint, in passage 3, concerning Meno's attempt to answer 'what is virtue?'

- A) Meno simply assumes virtue is most like a swarm of bees. But why shouldn't virtue be more like geometry, for example?
- B) Meno assumes women should be submissive to their husbands. But why shouldn't they be philosophers, like men are?
- C) Meno offers many examples of supposed virtues, but he provides no account of what they have in common – the form that makes them all virtues.
- D) Meno is wrong to try to answer the question 'can virtue be taught?' before he answers the question 'what is virtue?'
- E) If it is virtue for a woman to be submissive and for a husband to be an effective manager, it follows that to have virtue is to be submissive and an effective manager. But submissive people are not effective managers.

Passage 4, from Plato's *Meno*:

S: Now then, let me try to tell you what shape is. See whether you will accept the following account: shape, let's say, is the one thing that invariably accompanies color. Does this satisfy you, or do you want to go about defining the term in some other way? For myself, I would be satisfied if you defined virtue in some such way as this.

M: But this is a silly sort of definition, Socrates.

S: How so?

M: It's silly that you say shape always accompanies color. Because what if someone says he doesn't know what color is? He's just as confused about color as he is about shape. Now what do you say about your definition? (pdf, p. 6)

#### QUESTION 4

What is Meno's stated reason, in passage 4, for thinking Socrates' proposed definition of 'shape' is silly?

- A) It is silly to define shape in terms of color, for shape has nothing essentially to do with color.
- B) It is always silly to try to give general definitions.
- C) It is silly to define 'shape' in terms of 'color' because, possibly, someone doesn't know what 'color' means. Then the definition won't do any good.
- D) It is silly to define 'shape' in terms of 'color' because people who don't know what 'color' means can know what 'shape' means.
- E) It is silly to define shape in terms of color because it is possible to conceive of colorless shapes. Thus, shape does not invariably accompany color.

Passage 5, from Plato's *Meno*:

As everything in Nature is akin, and the soul has learned all, nothing prevents a man who has recalled one single thing - a process men call 'learning' - from discovering everything else; nothing, that is, if he is brave and does not weary of the search; for searching and learning are entirely recollection. We must, therefore, not credit your debater's quibble. It would make us lazy, and is music to the ears of spineless men; whereas my argument will make them enthusiastic and keen searchers. I trust that this is true. (pdf, p. 13)

### QUESTION 5

Which of the following arguments, by John Barrow, is most similar to the one Socrates makes in passage 5?

- A) The world simply is mathematical. But if we dig a little deeper we find nothing behind such a view. There is no explanation as to why the world of forms is stocked up with mathematical things rather than any other sort. (p. 271)
- B) The advantages of the Platonic picture of mathematics are obvious. It is simple. It makes the effectiveness of mathematics a thoroughly predictable fact of life. It removes human mathematicians from the centre of the mathematical universe where otherwise they must cast themselves in the role of Creators; and it explains how we can be so successful in arriving at mathematical descriptions of those aspects of the physical world that are furthest removed from direct human experience. (p. 272)
- C) Even Hermann Weyl [an anti-Platonist] felt a natural leaning towards the Platonic attitude of regarding mathematical entities as real and transcending the human creative process. He found that his tendency to veer from this dogma. . .felt unnatural and even acted as a restraining influence upon his mathematical creativity, because although "outwardly [anti-Platonism] does not seem to hamper our daily work, yet I for one confess that it has had a considerable practical influence on my mathematical life. It directed my interest to fields I considered relatively 'safe', and has been a constant drain on the enthusiasm and determination with which I pursued my research work." Here we see a viewpoint that is almost religious in the sense that it provides an underpinning necessary to give a meaning to life and human activity. It hints that, even if Platonism is not true, it is most effective for the working mathematician to act as if it were true. (p. 259)
- D) Only in one place in the ancient world do we find a highly developed notion of number in the abstract. That place is Greece and with it comes the first philosophical recognition of the very problems we are discussing. But its beginnings are very strange. (p. 251)
- E) The first reaction of the sceptical inquirer into the Platonic position is to draw attention to its frustrating vagueness. Where do all these mathematical objects live? (p. 273)

Passage 6, from Plato's *Republic*, Book I:

I like nothing better than conversation with my elders, Cephalus; I think of them as travellers who have taken a journey I may have to make myself; so I ought to find out from them whether the road is rugged and difficult, or smooth and easy. So this is the question I would like to put to you, who have arrived at that stage in life the poets call the "threshold of old age" – Is life harder towards the end? What can you tell us about it all? (pdf, p. 2)

**QUESTION 6**

What is Socrates' stated reason, in passage 6, for asking Cephalus the question he asks?

- A) Socrates likes having conversations with his elders.
- B) Socrates has to go on a journey, and Cephalus, being old, is well travelled. So he can describe road conditions.
- C) Old age, like old people, is rugged and difficult; whereas the young are smooth and easy. Therefore, old people, who have been both rugged and difficult and smooth and easy, can judge the various stages of life, from infancy on.
- D) Socrates asks whether life is 'harder towards the end', not because he wants to know himself, but because he is curious what Cephalus himself can 'tell us about it'.
- E) Socrates will probably be old himself someday, so he has an interest in finding out what it's like; those who know best will be those who know first-hand, i.e. old people.

Passage 7, from Plato's *Republic*, Book I:

He [Thrasymachus] roared out to the whole lot of us: what nonsense have you prize idiots been spouting, Socrates? And why do the both of you give way, ridiculously, to what the other says? I say that if you really want to know what justice is, you should not only ask the question. You like to compete; you want to win; and you know it's easier to win when you ask than when you answer. Now you answer the question yourself, and say what you think justice is. And I won't have any of this 'justice is what ought to be' or 'the beneficial', or 'the profitable', or 'the advantageous'. None of this nonsense will do for me, since what I want instead is a bit of clarity and precision. (pdf, p. 12)

### QUESTION 7

Thrasymachus makes which of the following claims against Socrates, in passage 7?

- A) Socrates has defined justice in terms of 'what ought to be', 'the beneficial', 'the profitable', so forth. And these terms are not sufficiently clear and precise.
- B) Socrates perversely refuses to accept Thrasymachus' definition of 'justice' as 'the advantage of the stronger'.
- C) Socrates refuses to admit that arguments about things like 'justice' are invariably competitions. Socrates persists in regarding questions like 'what is justice' as having clear, precise answers of the form, 'what ought to be', 'the beneficial', and so forth.
- D) Socrates has persistently refused to answer Thrasymachus' simple question: 'what is justice?'
- E) Socrates asks questions and never gives answers because he wants to win. He knows this sort of competition is easier to win if you ask and don't answer.

Passage 8, from Plato's *Republic*, Book I

Tell me, Thrasymachus, is this what you meant to say justice was: what the stronger thought to be his advantage, whether it really is or not? Shall we say this is what you mean?

Absolutely not, he said. Do you think I would call someone who makes a mistake 'the stronger' at just the moment when he makes some mistake?

Yes, I said, my distinct impression was that this was exactly what you did when you admitted that the ruler was not infallible but might sometimes make mistakes

You argue like a slanderous witness in court, Socrates. For example, do you call someone who is mistaken about the sick 'a doctor' just in virtue of the fact that he is mistaken? Or do you say that he who makes mistakes in math is a mathematician when he is making the mistake, and precisely because he is mistaken? It's true that we say 'the doctor has made a mistake' or 'the mathematician has made a mistake' or 'the grammarian has made a mistake', but this is just a loose way of talking. For I think none of them, insofar as he is what we call him, ever makes a mistake. (pdf, p. 17)

**QUESTION 8**

In passage 8, Thrasymachus in effect accuses Socrates of 'slandering' him by twisting the meanings of his words. How so?

- A) Thrasymachus takes it to be obvious that 'the stronger' never mistakes his own advantage. For everyone – weak and strong - always and only seeks his or her own personal advantage, by definition. Socrates criticizes Thrasymachus' position on the assumption that sometimes people are self-sacrificing, which Thrasymachus denies.
- B) When Thrasymachus admitted that rulers are not infallible but sometimes make mistakes, he was obviously speaking loosely. Strictly, the ruler ceases to be ruler at the moment he makes a mistake. It is unfair for Socrates to seize upon a loose, verbal formulation and to ignore what Thrasymachus plainly meant by 'ruler'.
- C) In his typical way, Socrates has dragged in doctors and mathematicians and grammarians to make his opponent's position look absurd. But Thrasymachus points out that, since he is concerned only with rulers, it is unfair to attack his account for not applying to everyone.
- D) Socrates assumes Thrasymachus meant 'thought to be to his advantage' when he plainly said – and meant – 'advantage'. Of course, a contradiction has emerged. But if we simply stick with 'advantage', there is no contradiction.
- E) Thrasymachus says Socrates has slandered him by twisting his words. But he does not say how. Instead, he abruptly changes the subject from 'the stronger' and 'rulers' to doctors, mathematicians and grammarians.

Passage 9, from Descartes' "First Meditation":

The more carefully I reflect on all this, the more clearly I see that there are never any sure signs by means of which one can distinguish wakefulness from sleep. As a result, I begin to feel stupefied, and this feeling only reinforces the notion that I may be asleep.

Therefore, let us now suppose we dream: that these things - that my eyes are open, that I shake my head and stretch out my hands - are not true. Perhaps, indeed, I do not even have such things as hands or a body at all. On the other hand, at least this much has to be admitted: the visions which come in sleep are like paintings, insofar as they are things that can only be fashioned in the likeness of real things. Therefore at least these general kinds of things - eyes, head, hands and bodies as such - are not figments of imagination but are real and exist. (pdf, p. 2)

### QUESTION 9

In passage 9, why does Descartes regard it as appropriate to suppose he is dreaming? (Plainly, he can doubt he is dreaming; and he has resolved to doubt everything he can. So why is this supposition legitimate?)

- A) Descartes is trying to prove he is not dreaming, by *reductio ad absurdum*. So he begins by assuming he is dreaming. When a contradiction emerges, in the course of constructing the so-called 'painting analogy', he knows he is not dreaming.
- B) Descartes is trying to prove he is dreaming by way of amplifying his skeptical concern that he may be asleep. If he is dreaming, he must be asleep.
- C) At this point Descartes is simply neglecting to follow his own procedure of doubting what can be doubted.
- D) Descartes assumes he is dreaming only by way of constructing an argument – the so-called 'painting analogy' – that seeks to prove that even if he is dreaming, some of his beliefs may still have to be true.
- E) Descartes only supposes he is dreaming because he is 'stupefied' into momentarily forgetting to doubt everything. Descartes hereby illustrates his view that stupefied people, i.e. those who do not doubt everything all the time, live as if in a dream.

Passage 10, from Descartes' "Second Meditation":

So, after considering everything very thoroughly, I must finally conclude that this proposition, 'I am, I exist', is necessarily true whenever uttered by me or conceived by my mind.

But I do not yet sufficiently understand what this 'I' is that now necessarily exists. So I must be careful not to mistake something else for this 'I', and so make a mistake concerning that very item of knowledge I maintain is most certain and evident of all. (pdf, p. 2)

### QUESTION 10

The situation Descartes takes himself to be in, in passage 10, is most analogous to which of the following:

- A) Physicists are unable to determine whether there is dark matter in the universe, because they are unable to determine what properties it would have if it did exist.
- B) Physicists simultaneously establish that dark matter necessarily exists and what its essential properties must be. For it is impossible to know that something necessarily exists without immediately knowing its essential properties.
- C) Physicists are unable to determine whether dark matter exists in the universe because they are unable to determine whether they themselves exist in the universe – rather than in some other (possibly non-existent) universe.
- D) Physicists are able to determine that dark matter must certainly exist under certain circumstances, but they are not immediately able to determine its essential properties, which therefore demand further, careful investigation.
- E) Physicists are able to determine what properties dark matter would have, if it did exist. But they are unwilling to assume, simply because the conception of dark matter makes sense, that it must exist.

Passage 11, from David Chalmers' "Facing Up to the Problem of Consciousness":

It is undeniable that some organisms are subjects of experience. But the question of how it is that these systems are subjects of experience is perplexing. Why is it that when our cognitive systems engage in visual and auditory information-processing, we have visual or auditory experience: the quality of deep blue, the sensation of middle C? How can we explain why there is something it is like to entertain a mental image, or to experience an emotion? It is widely agreed that experience arises from a physical basis, but we have no good explanation of why and how it so arises. Why should physical processing give rise to a rich inner life at all? It seems objectively unreasonable that it should, and yet it does.

QUESTION 11

In passage 11, Chalmers outlines a problem, as he sees it. Which of the following is the best statement of his view?

- A) Almost everyone thinks experience arises 'from a physical basis'. But this is obviously impossible – since objectively unreasonable, no good explanation can be offered, etc. Thus, almost everyone believes something that cannot possibly be true.
- B) 'It is undeniable that some organisms are subjects of experience.' Yet it is impossible to know which organisms those are, since all we can know about organisms are physical facts, and it is 'objectively unreasonable' to think that experience arises from physical processing.
- C) Experience undeniably actually exists. Yet no explanation has ever been offered of how it could possibly exist; since the thing that, it is generally agreed, must explain experience – namely, physical processing – doesn't seem to explain it, so far as anyone can tell.
- D) It is clear why visual and auditory information-processing must be accompanied by experience. (If you can't have the sensation of middle C, you can't auditorily process middle C. If you can't appreciate the subjective quality of deep blue, you can't visually process deep blue.) Experience obviously must accompany function. But why is it the case, then, that experience can only arise from physical processes, since it seems that functionality and physicality are distinct?
- E) Given that all that we undeniably know are the facts of experience, how do we know that physical processes even exist? Hence, how can we know how the undeniable facts of experience arise from deniable physical processes?

Passage 12, from David Chalmers' "Facing Up to the Problem of Consciousness":

At this point some are tempted to give up, holding that we will never have a theory of conscious experience. McGinn (1989), for example, argues that the problem is too hard for our limited minds; we are "cognitively closed" with respect to the phenomenon. Others have argued that conscious experience lies outside the domain of scientific theory altogether.

I think this pessimism is premature. This is not the place to give up; it is the place where things get interesting. When simple methods of explanation are ruled out, we need to investigate the alternatives. Given that reductive explanation fails, *nonreductive* explanation is the natural choice.

### QUESTION 12

Assuming what passage 12 says is correct, it would be reasonable to infer which of the following (and, yes, it's OK if you have no idea who McGinn is):

- A) McGinn has an elaborate theory of conscious experience, based on the idea that our minds are 'cognitively closed' with respect to the phenomena.
- B) Chalmers thinks McGinn assumes any explanation of consciousness would have to be reductive.
- C) McGinn thinks the problem with theories of conscious experience is that we are forever being tempted by them. We need to avoid temptation by becoming 'cognitively closed' to such theories.
- D) Chalmers agrees with various writers who think conscious experience lies outside the domain of scientific theory.
- E) Both B and C are reasonable inferences.

Passage 13, from Lakoff and Nuñez, *Where Mathematics Comes From*:

We should point out that even on the basis of mathematics itself – without any scientific evidence – the claim that transcendent mathematics exists appears to be untenable. One important reason is that mathematical entities such as numbers are characterized in mathematics in ontologically inconsistent ways. Here are some of the ways that natural numbers are characterized within modern mathematics:

1. On the number line, all numbers are points on a line. . .
2. In set theory, numbers are sets. . .
3. In combinatorial game theory numbers are values of positions in combinatorial games. . .

But, again according to transcendent mathematics, there should be a single kind of thing that numbers are; that is, there should be a unique ontology of numbers. Numbers should either be zero-dimensional geometric entities lined up in an order, or they should be sets of the appropriate structure, or they should be values of positions in games, or something else, or just numbers – but only one kind! This is an inherent problem in the philosophical paradigm of transcendent mathematics. (p. 342-3)

### QUESTION 13

Which of the following is the best statement of Lakoff and Nuñez's argument, in passage 13?

- A) Transcendent mathematics demands mathematicians eliminate the number line, or set theory, or combinatorial game theory, in order to render mathematics consistent. But transcendent mathematics is mistaken to make these sorts of extreme demands of mathematicians.
- B) Transcendent mathematics accepts the number line, set theory and combinatorial game theory as true, merely because they are mathematical. But obviously at least two out of the three have to be false, since their claims about number are mutually inconsistent. Therefore much of mathematics must be false. Therefore much of transcendent mathematics appears to be untenable.
- C) Transcendent mathematics is committed to the truth of the number line, set theory, and combinatorial game theory. But this implies the truth of contradictions about the nature of number. Transcendent mathematics cannot admit the truth of contradictions. Therefore, transcendent mathematics is itself apparently untenable.
- D) It is impossible to verify, empirically, which version of the nature of number is true – that implied by the number line, that implied by set theory, or that implied by combinatorial game theory. Therefore, there is no such thing as empirically responsible mathematics. Therefore, there is no such thing as transcendent mathematics.
- E) Transcendent mathematics must be false because proofs of its falsehood exist. There is one such proof by means of the number line, another by means of set-theory, yet another by means of combinatorial game theory. In order to maintain the truth of transcendent mathematics, we would have to deny much modern mathematics. But surely the denial of so much mathematics is less plausible than the denial of transcendent mathematics.

Passage 14, from Lakoff and Nuñez, *Where Mathematics Comes From*:

There is no way to make sense of what it would mean for the mathematics to literally be out there in the physical universe . . .

Take the use of Cartesian coordinates in stating physical laws. There are no physical Cartesian coordinates literally extending out there into space, with an origin (zero-point) at some point in space and positive numbers extending off in one direction and negative numbers extending off in the opposite direction. The idea of Cartesian coordinates is a human idea that human physicists impose upon space in order to use mathematics to do calculations. They are not *physically* out there. (p. 344)

**QUESTION 14**

Which of the following assumptions do Lakoff and Nunez appear to be making in passage14?

- A) If there were any mathematical objects literally in the physical universe, they would have to be physical objects; the physical universe can contain nothing non-physical.
- B) Mathematics is an empirical science. The only way to verify mathematical truths is to gather data about the physical objects characterized by those mathematical truths.
- C) It is impossible to state physical laws except by means of Cartesian coordinate grids.
- D) If there were any mathematical objects in the physical universe, they would have to be in physical objects. Hence they would not be directly observable. Hence, we cannot know they exist.
- E) Both B and D.

Passage 15, from John Barrow, *Pi in the Sky*:

One of the most transparent manifestations of the Platonic assumption of the universality of mathematics is the search for extraterrestrial intelligence in the Universe. For many years terrestrial radio telescopes have broadcast signals in the direction of nearby star systems and solar system probes have carried artefacts and information stores which are supposed to give any extraterrestrial discoverer definitive information about ourselves and our vicinity. The information that is sent in these transmissions assumes that mathematics is a universal language. It gives examples of our own mathematical knowledge and even broadcasts on special frequencies which have fundamental significance for anyone possessing a sophisticated (enough to detect radio signals) knowledge of physics. . . Whilst no one expects extraterrestrials to have the same representations of mathematical concepts as we do, the assumption is that they would be in possession of the same *concepts* nevertheless. This implicitly assumes that there is a universal mathematics that all extraterrestrials will eventually discover. If the Platonic philosophy of mathematics is not true and mathematics possesses a strong cultural element, or is an approximation to reality that our minds have invented in response to the evolutionary pressures created by our particular terrestrial environment, then extraterrestrial mathematics will not be like ours. (p. 265-6).

### QUESTION 15

Which of the following is the best statement of Barrow's argument in passage 15?

- A) Platonism is probably true, since it is reasonable to think intelligent extraterrestrials, if there are any, will be able to understand the signals we are sending them. (Platonism explains why this reasonable assumption is indeed reasonable.)
- B) Platonism is probably false, because there is no good reason to think intelligent extraterrestrials, if there are any, will be able to understand the signals we are sending them. (Platonism is probably false because it unreasonably predicts something that is inherently unknowable.)
- C) If you believe, as many do, that intelligent extraterrestrials (if any) will probably be able to understand our signals, you should be a Platonist, because no other philosophy of mathematics explains why this is likely.
- D) If you are not a Platonist about mathematics, you should probably not believe that intelligent extraterrestrials (if any) will be able to make sense of our signals, because the character of their mathematics (if any) will be dictated by alien evolutionary and cultural factors and circumstances.
- E) C and D are equally good statements of Barrow's argument.

Passage 16, from John Barrow, *Pi in the Sky*:

Suppose that instead of spending this chapter discussing the nature of mathematics we had picked upon music. We could then have debated whether musicians invented new tunes and rhythms or whether they discovered them in some world of universal musical entities. Indeed, the comparison is rather interesting because the Pythagoreans regarded music and mathematics as closely linked because of the mathematical relations between what are now called musical intervals. The discovery of the simple numerical ratios linking the musical scale with the 'harmonic' progression of string lengths was probably one of the key motivations for the Pythagoreans to conclude that everything was imbued by number. The formalists and constructivists could lay down definite rules of harmony and composition, but there would always be musicians who wish to innovate and improvise and break the rules. The real difference between the structures of mathematics and music is that, whereas there is no basic condition which tells whether or not something is music, irrespective of whether we happen to like the sound of it, there is such a criterion in mathematics. Inconsistency is sufficient to disqualify a prospective mathematical structure. It is this appeal to something that feels objective that is responsible for the suspicions that there is an aspect to be discovered, regardless of how much that element may subsequently be embroidered by human constructions. (p. 268)

#### QUESTION 16

Which of the following is the best statement of the point Barrow makes concerning music and mathematics in passage 16?

- A) Mathematics is closely related to music. This fact was discovered first by the ancient Pythagoreans, who discovered the specific ratios linking the musical scale with the 'harmonic' progression of string lengths.
- B) The question – invention or discovery? – that can be asked of mathematics can be asked of music. And the cases may seem similar. Yet it is reasonable to regard mathematics as a better candidate for discovery than musical tunes. For mathematics is governed by the need for consistency as music is not.
- C) There are suspicions that there is an element of discovery in mathematics, regardless of how much that element may subsequently be embroidered by human musical constructions.
- D) One can lay down formal rules for musical composition, just as one can lay down formal rules for proof in mathematics. It does not follow that music is mathematics, as the Pythagoreans believed. For in order to get from music to mathematics, one must add the crucial element of consistency.
- E) Mathematics feels objective, whereas music feels subjective. Yet mathematics and music have much in common. The source of the difference in our feelings towards the two must be due to the one difference between them: namely, the demand for consistency in mathematics, which is absent from music.

Passage 17, from C. S. Lewis, "Bluspels and Flalansferes":

We talked as if the present-day user of the word *anima* [soul] could prove his right to neglect that word's buried metaphor by turning round and giving us an account of the soul which was not metaphorical at all. That he has power to dispense with the particular metaphor of *breath*, is, of course agreed. But we have not yet inquired what he can substitute for it. If we turn to those who are most anxious to tell us about the soul – I mean the psychologists – we shall find that the word *anima* has simply been replaced by complexes, repressions, censors, engrams, and the like. In other words the *breath* has been exchanged for *tyings-up*, *shovings-back*, *Roman magistrates*, and *scratchings*. If we inquire what has replaced the metaphorical *bright sky* of primitive theology, we shall only get a *perfect substance*, that is, a *completely made lying-under*. . . . The point need not be laboured. It is abundantly clear that the freedom from a given metaphor which we admittedly enjoy in some cases is often only a freedom to choose between that metaphor and others. (p. 151)

Passage 18, from Descartes' "Second Meditation":

But as to the nature of this soul [*anima*], either I gave no thought at all, or else I imagined it to be an attenuated thing, like a wind [breath] or fire or ether, which permeated my more solid parts.

Passage 19, from Descartes' "Sixth Meditation" [Yes, I know you didn't read it, but you ought to be able to understand it on the basis of what you did read.]

Now, from the mere fact that I know for certain that I exist and that I cannot see anything else that belongs necessarily to my nature and existence except that I am a thinking thing, I rightly conclude that my essence consists in this alone, that I am a thinking thing, a substance whose whole nature or essence is to think.

**QUESTION 17**

On the basis of passage 17, it would be reasonable to infer that Lewis would agree to which of the following statements about Descartes' remarks (in passages 18 and 19)?

- A) Descartes can prove his independence from the metaphor of breath only by successfully exchanging that term for non-metaphoric terms like 'substance' and 'think'.
- B) The clarification Descartes feels he has achieved, shifting from a conception of soul-as-wind-or-breath to a conception of soul-as-thinking-substance is illusory. Both conceptions are thoroughly metaphorical.
- C) From the fact that Descartes is free to dispense with one metaphor for the soul, it follows that he must have a non-metaphorical conception of soul.
- D) In shifting from a conception of soul-as-breath to soul-as-thinking-substance, Descartes has moved from a sensory metaphor (breath) to a theological metaphor (substance). Scientifically speaking, this is a step backwards.
- E) Even if Descartes succeeds in trading a metaphorical conception of soul for a non-metaphorical conception, it does not follow that he really has the power to dispense with the particular metaphor of breath.

Passage 20, from Isaiah Berlin, "Two Concepts of Liberty":

If men never disagreed about the ends of life, if your ancestors had remained undisturbed in the Garden of Eden, the studies to which the Chichele Chair of Social and Political Theory is dedicated could scarcely have been conceived. For these studies spring from, and thrive on, discord. Someone may question this on the ground that even in a society of saintly anarchists, where no conflicts about ultimate purposes can take place, political problems, for example, constitutional or legislative issues, might still arise. But this objection rests on a mistake. Where ends are agreed, the only questions left are those of means, and these are not political but technical, that is to say, capable of being settled by experts or machines, like arguments between engineers or doctors. That is why those who put their faith in some immense, world-transforming phenomenon, like the final triumph of reason or the proletarian revolution, must believe that all political and moral problems can thereby be turned into technological ones. (p. 166)

**QUESTION 18**

On the basis of passage 20, it would be reasonable to infer that Berlin would agree to which of the following statements?

- A) If everyone agrees (say) that absolutely every citizen must be housed, then all that remains is to arrange for enough housing units to be built, and their correct allocation. These are not political problems but technical obstacles for builders and so forth. On the other hand, if some people think the government should house every citizen, whereas others think this would foster undesirable dependency, and still others think this would be too costly, then politics will enter into it.
- B) It is impossible, in principle, for political problems to be settled by technicians or machines.
- C) Someone might object to Berlin as follows. Even if it is unanimously agreed (say) that every citizen must be housed, taxes must still be raised to pay builders; and taxes are political matters. But this misses Berlin's point: if everyone agrees to the housing measure, the tax question is effectively settled; all that remains is determining cost – a technical question – and collecting money – a technical problem. The design of the tax (who it hits hardest) might still be debated, but if everyone agrees not just about the desirability of universal housing, but about every other end, this will be yet another technical problem for experts to solve in the most efficient manner.
- D) Both A and B.
- E) All of A, B and C.

Passage 21, from Isaiah Berlin, "Two Concepts of Liberty":

Coercion is not, however, a term that covers every form of inability. If I say that I am unable to jump more than ten feet in the air, or cannot read because I am blind. . . it would be eccentric to say that I am to that degree enslaved or coerced. Coercion implies the deliberate interference of other human beings within the area in which I could otherwise act. You lack political liberty or freedom only if you are prevented from attaining a goal by human beings. Mere incapacity to attain a goal is not lack of political freedom. (p. 169)

**QUESTION 19**

If what Berlin says about coercion in passage 21 is true, which of the following would seem to follow?

- A) The fact that I cannot travel to Alpha Centauri, due to certain physical laws, is not an instance of coercion, because human beings did not legislate the laws in question.
- B) Optimists and pessimists about the perfectibility of human political affairs may disagree about whether certain existing arrangements are coercive. For the optimists may blame human beings for things the pessimists think are beyond any deliberate control.
- C) If you are not coercively prevented from doing something, you can do it if you want.
- D) Both A and B.
- E) All of A, B and C.

Passage 22, from Douglas Rushkoff, *Coercion*:

My purpose is to help us get free of coercion, not simply live in reaction to it – especially if that reaction is to succumb to a constant state of suspicion. It wouldn't be a fun way to go through life. Believe me – researching and writing this book has brought me there more than once. Besides, suspicious people are some of the most easily manipulated. Ironically, perhaps, the more fun you're having in life, the more satisfied you are with yourself, the harder a target you are to reach.

The fact is, *everything* is coercive. Even something as minute as the way I put the word "everything" in italics is meant to influence you. There's nothing wrong with attempting to sway others to our own way of thinking, especially if we truly believe we are right. It's how relationships, families, businesses, and societies improve themselves. If someone has a better idea for how to dig a hole, elect a leader, or raise happy children, it's up to that person to convince us why he's right.

### QUESTION 20

Which of the following would be a reasonable objection to what Rushkoff says in passage 22?

- A) If what Rushkoff says about coercion is true, his stated purpose can never be achieved. Thus, he cannot seriously be trying to do what he says he is.
- B) Heightening our collective suspicion level will never suffice as a method for resisting coercion.
- C) From the fact that something is meant to influence you, it follows that it is coercive.
- D) From the fact that everything is coercive it doesn't follow that there is something wrong with everything.
- E) Both A and C.

**END OF PAPER**