

Category A (Social Science, History, and Philosophy)

1. "[On a Supposed Right to Lie](#)" is an essay written by Immanuel Kant in response to a challenge to Kant's ethical theory posed by a critic named Benjamin Constant; it is usually appended as a supplement to Kant's "Critique of Practical Reason" and is available [here](#).
Constant asked if "the German philosopher" (meaning Kant) actually intended that, even if a murderer comes to the door asking for the location of his next victim and you know he is in the next room, the right thing to do would still be to tell the truth. (This has been discussed as "the murderer at the door problem.") Constant's suggestion is that it seems obvious in this case that the right thing to do is to lie (despite what Kant's theory would dictate).
 - (1) In broad strokes, how does Kant answer this challenge?
 - (2) More precisely, what does Kant mean by saying that the truth-teller is not in a real sense free to choose his or her action?
 - (3) More precisely still, what does Kant mean in his last paragraph when he says that "exceptions destroy the universality"? Why does Kant believe this is so important? Is it, according to you?
2. Using the text of [the Constitution of the United States](#) and arguments written in support of the ratification contained in the [Federalist Papers](#), discuss how, if, and why the Constitution remains an effective tool for governing the United States of America. Do you perceive a conflict between the original historical context and the realities of contemporary political life?
3. In the [Analects](#), Confucius identifies the cardinal virtue of *ren* (variously translated as goodness, humanity, benevolence) with many different attitudes and behaviors. Yet Confucius also says, "There is one thread that runs through my doctrines." Commentators differ about what that one thread is. What, in your opinion, could that one thread be? How does that one thread tie together the wide range of moral values that Confucius celebrates in the *Analects*? Support your answer by interpreting specific passages from the [text](#).
4. There has been a great deal of public debate about the increase in inequality of wealth in the United States. At the same time, making it possible for any hard-working individual to improve his or her living standards is often seen as an economic right. Discuss whether or not economic equality should be a central concern for policy makers. Taking the role of a policy maker, construct economic arguments to foster upward wealth mobility in the United States or your home nation. The following resources might aid your argument (you need not limit yourself to these sources, however): www.levyinstitute.org ;www.equality-of-opportunity.org ;www.un.org/millenniumgoals/
5. In 1919 historian and sociologist Max Weber delivered two influential speeches to German university students who were trying to make sense of the German defeat in World War I. The speeches, "Politics as a Vocation" [LINK] and "Science as a Vocation" [LINK], address the nature of learning, scholarship, and political action. Read these speeches and write an essay that focuses on one or more aspects of Weber's argument with which you either agree or disagree. You may want to consider one speech or compare the two. In what ways are Weber's views relevant today, nearly a century after they were delivered?
6. The United Nations was created by the victors of the Second World War, with the Security Council as its core. Can an institution created in 1945 and dominated by five permanent members (the United States, Russia, China, the United Kingdom, and France) respond to today's global challenges? What changes might occur in the Security Council to make the United Nations a more representative and effective institution? In writing your answer, you should consult the [UN Charter](#) and the [Report of the Secretary-General: In larger freedom](#) (especially section 5).

Category B (Arts and Literature)

1. “Anyone who is too lazy to master the comparatively small glossary necessary to understand Chaucer deserves to be shut out from the reading of good books forever.” —Ezra Pound, *ABC of Reading*

Read “[The Pardoner's Tale](#).” Construct an argument in favor or against Pound's statement. In writing your answer, refer to at least one other text from the period, for example, Langland's *Piers Plowman*, or [The Song of Roland](#).

2. It is often said that the U.S. national anthem is hard to sing and that to many the text makes little sense. Imagine that there is a competition for a new national anthem. Write a musical composition for that imaginary competition in any style using the opening text of [the Declaration of Independence](#):

When in the Course of human events it becomes necessary for one people to dissolve the political bands which have connected them with another and to assume among the powers of the earth, the separate and equal station to which the Laws of Nature and of Nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation. We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.

3. Nikolai Gogol's [The Nose](#) (1835) is considered one of the funniest works of Russian literature. It is the story of a man who wakes up one morning without his nose. But as its narrator quizzically puts it, “the most incomprehensible thing of all is, how authors can choose such subjects for their stories.” Ever since Aristotle, students expect to glean some wisdom from literature. But then, what to make of seemingly gratuitous and absurdist stories like Gogol's [The Nose](#)?
4. Is a picture worth a thousand words? Choose three images by different artists from the attached catalogue. Write a thousand words or less per image that express what you believe corresponds to, or represents the work of art—what each work “seems to be about” or what the artist intended.
5. Writers and commentators have expressed contrasting views on the relationship between truth and beauty. Take, for example, these excerpts from George Herbert ([full text available here](#)) and John Keats ([full text available here](#)). What is the relationship between truth and beauty?

*Who says that fictions onely and false hair
Become a verse? Is there in truth no beauty?
Is all good structure in a winding stair?
May no lines passe, except they do their dutie
Not to a true, but painted chair?
George Herbert, “Jordan 1” (1633)*

*O Attic shape! fair attitude! with brede
Of marble men and maidens overwrought,
With forest branches and the trodden weed;
Thou, silent form! dost tease us out of thought
As doth eternity: Cold Pastoral!*

*When old age shall this generation waste,
Thou shalt remain, in midst of other woe
Than ours, a friend to man, to whom thou say'st,
Beauty is truth, truth beauty,—that is all
Ye know on earth, and all ye need to know.
John Keats, “Ode on a Grecian Urn” (1820)*

In writing your answer you may also refer to Edmund Burke's “[A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful](#).”

6. Read Aeschylus's [Prometheus Bound](#). Why did the gods punish Prometheus for stealing fire and giving it to man?

7. Mary Shelley's novel *Frankenstein* is best known for its influence in popular culture through many film adaptations. It is in fact, however, one of the great novels of ideas. Write an essay that discusses in what sense you think it is a novel of ideas. What are its claims about human reason and human nature?

Category C (Science and Mathematics)

1. Consider the following two-player game, Don't be Greedier, that involves players taking alternate turns removing pebbles from one pile of pebbles, subject to the following rules: (1) The player to remove the last pebble or pebbles from the pile wins the game. (2) On the very first move of the game, the player to play is not allowed to remove all the pebbles and win immediately (that would be greedy). (3) After the first move, the number of pebbles removed can't be more than the number of pebbles removed in the turn immediately prior (that would be greedier). That is, the sequence of numbers of pebbles removed on each turn is a monotonically nonincreasing sequence. Starting with a pile of 12 pebbles, which player would win a game of Don't be Greedier, assuming optimal play?
2. Read this article on the use of fecal transplants to cure clostridium difficile or obesity, "[Duodenal Infusion of Donor Feces for Recurrent Clostridium difficile](#)," from the *New England Journal of Medicine*. Design a research trial to test whether another disease may be cured using microbes from the human biome.
3. Why is factoring numbers into primes a difficult problem?
4. The origin of chirality (or "handedness") in a prebiotic life is a question that lingers across all subfields of the physical and natural sciences. Biological constructs such as proteins, enzymes, DNA, and RNA function with well-defined, three-dimensional structure. We know that these constructs are composed of a set of homochiral amino acids and sugars that are labeled according to the direction they rotate plane-polarized light (L vs. D). In a series of communications, Ronald Breslow and coworkers (PNAS 2006, 2009, and 2010) have approached this question and performed a set of experiments showing how this chirality could have developed from the chemical influence of amino acids discovered as part of the Murchison meteorite. Read these communications and develop a detailed experiment that may either support or refute Breslow's claims.
<http://www.pnas.org/content/103/35/12979.full.pdf> ; <http://www.pnas.org/content/107/13/5723.full.pdf> ;
<http://www.pnas.org/content/early/2009/05/28/0904350106.full.pdf>
5. In a landmark paper, Dr. Francis Crick defends his 1958 statements describing the central dogma of molecular biology, defined as DNA *transfers information to make* RNA *transfers information to make* protein. Using this original document ([Crick, 1970](#)), explain how prion disorders (described in the Nobel Lecture by [Prusiner, 1998](#)) would be classified within this central dogma. Additionally, explain why the mechanism transmission by prions is so difficult to prove experimentally.
6. Read the article [The AI Behind Watson--The Technical Article](#). Drawing from the materials presented in the article explain why computers can beat human beings at certain games but not others.
7. In his 1963 [lecture on gravity](#) (you can also see a [video here](#)) Richard Feynman mentions that the "weird" behavior of Uranus led to the discovery of a new planet. More precisely, the fact that Uranus's movement did not fit what was predicted by the then-current understanding of planetary motion could be explained by the existence of a not-yet-observed planet - and the planet was then observed right where predicted. Suppose that observatories had looked at the indicated position and had not actually found the predicted planet. What then? What new questions would this outcome pose for the scientific community? How could they test other explanations for the unexpected motion of Uranus?
8. Why is this primarily a scientific rather than a literary passage?
"It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct

action of the conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less improved forms. Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone circling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved." (Darwin, [Origin of Species](#), page 433)