

**Exam WM0324LR**  
**Ethics and engineering for aerospace engineering**  
**April 6, 2017**

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This exam consists of 30 multiple choice questions, that are related to three short texts. Each question only has one right answer. If you do not know the answer, you may make a guess. This exam counts for 30% of the full mark of this course.

You may use a **dictionary**. Good luck!

## How Uber Deceives the Authorities Worldwide

This text accompanies question 1-10

Based on: [https://www.nytimes.com/2017/03/03/technology/uber-greyball-program-evade-authorities.html?\\_r=0](https://www.nytimes.com/2017/03/03/technology/uber-greyball-program-evade-authorities.html?_r=0)

Uber has for years engaged in a worldwide program to deceive the authorities in markets where its low-cost ride-hailing service was resisted by law enforcement or, in some instances, had been banned. The program, involving a tool called Greyball, uses data collected from the Uber app and other techniques to identify and circumvent officials who were trying to clamp down on the ride-hailing service. Uber used these methods to evade the authorities in cities like Boston, Paris and Las Vegas, and in countries like Australia, China and South Korea. Greyball was part of a program called VTOS, short for “violation of terms of service,” which Uber created to root out people it thought were using or targeting its service improperly. The program, including Greyball, began as early as 2014 and remains in use, predominantly outside the United States.

Greyball and the VTOS program were described to The New York Times by four Uber employees. The four spoke on the condition of anonymity because the tools and their use are confidential and because of fear of retaliation by Uber.

Uber’s use of Greyball was recorded on video in late 2014, when Erich England, a code enforcement inspector in Portland, tried to hail an Uber car downtown in a sting operation against the company.

At the time, Uber had just started its ride-hailing service in Portland without seeking permission from the city, which later declared the service illegal. To build a case against the company, officers like Mr. England posed as riders, opening the Uber app to hail a car and watching as miniature vehicles on the screen made their way toward the potential fares. But unknown to Mr. England and other authorities, some of the digital cars they saw in the app did not represent actual vehicles. And the Uber drivers they were able to hail also quickly canceled. That was because Uber had tagged Mr. England and his colleagues — essentially Greyballing them as city officials — based on data collected from the app and in other ways. The company then served up a fake version of the app, populated with ghost cars, to evade capture.

Using its app to identify and sidestep the authorities where regulators said Uber was breaking the law goes further toward skirting ethical lines — and, potentially, legal ones. Some at Uber who knew of the VTOS program and how the Greyball tool was being used were troubled by it. In a statement, Uber said, “This program denies ride requests to users who are violating our terms of service — whether that’s people aiming to physically harm drivers, competitors looking to disrupt our operations, or opponents who collude with officials on secret ‘stings’ meant to entrap drivers.” The mayor of Portland, Ted Wheeler, said in a statement, “I am very concerned that Uber may have purposefully worked to thwart the city’s job to protect the public.”

An Uber service that many regulators have had problems with is the lower-cost version, known in the United States as UberX, which essentially lets people who have passed a background check and vehicle inspection become Uber drivers quickly. In the past, many cities have banned the service and

declared it illegal. After the authorities caught on to what was happening, Uber and local officials often clashed. Eventually, agreements were reached under which regulators developed a legal framework for the low-cost service.

That approach has been costly. Law enforcement officials in some cities have impounded vehicles or issued tickets to UberX drivers, with Uber generally picking up those costs on the drivers' behalf. The company has estimated thousands of dollars in lost revenue for every vehicle impounded and ticket received. This is where the VTOS program and the use of the Greyball tool came in. When Uber moved into a new city, it appointed a general manager to lead the charge. This person, using various technologies and techniques, would try to spot enforcement officers.

Uber employees said the practices and tools were born in part out of safety measures meant to protect drivers in some countries. In France, India and Kenya, for instance, taxi companies and workers targeted and attacked new Uber drivers. But as Uber moved into new markets, its engineers saw that the same methods could be used to evade law enforcement. Once the Greyball tool was put in place and tested, Uber engineers created a playbook with a list of tactics and distributed it to general managers in more than a dozen countries on five continents.

At least 50 people inside Uber knew about Greyball, and some had qualms about whether it was ethical or legal. To date, Greyballing has been effective. In Portland on that day in late 2014, Mr. England, the enforcement officer, did not catch an Uber, according to local reports. And two weeks after Uber began dispatching drivers in Portland, the company reached an agreement with local officials that said that after a three-month suspension, UberX would eventually be legally available in the city.

1. Uber's use of the Greyball tool seems ethically questionable. Let's assume that the engineers who created tool knew how it would be used (e.g. to avoid regulatory enforcement). Under which of the following models are the engineers not responsible because they were following the orders of the company's managers and executives?
  - a. Technocracy
  - b. Collective responsibility
  - c. **Separatism**
  - d. Corporate liability
  
2. There are some important differences between moral responsibility and legal liability. Which of the following claims about these differences is correct?
  - a. Moral responsibility is always forward-looking; legal liability is always backward looking
  - b. Legal liability is not concerned with blameworthiness
  - c. Moral responsibility is usually connected to compensation, whereas legal liability is connected to punishment
  - d. **Legal liability demands well-formulated procedures**
  
3. As the article states, "At least 50 people inside Uber knew about Greyball, and some had qualms about whether it was ethical or legal." Some of those people decided to take action based on their doubts about how the tool was being used. Which of the following describes their action?
  - a. Confusion of law and ethics
  - b. Ethical relativism
  - c. Cost-benefit analysis
  - d. **Whistleblowing**
  
4. The idea of corporate social responsibility (CSR) argues that corporations have ethical obligations toward society that go beyond following the law and their own self-interest. If Uber decided to implement a CSR policy after its Greyball scandal, which of the following duties could be part of their CSR policy?
  - a. Make profit within the limits of the law
  - b. **Help craft regulation for new technology**
  - c. Create a mission statement that explains their core values
  - d. Comply with code enforcement agencies

5. Which of the following statements is the best characterization of CSR?
- It is active responsibility, because it relates to the capacity to look forwards**
  - It is passive responsibility, because active responsibility can only relate to individuals
  - It is professional responsibility, because it relates to market organizations
  - It is a form of window-dressing
6. As a profession, engineers are governed by codes of conduct. While these codes are usually advisory, they provide guidelines that outline the responsibilities and obligations that engineers are expected to uphold. However, at times parts of a code can be in tension or even contradict with other parts of the code. In these cases, the engineer must decide which duty or principle supersedes the others. If you were an engineer tasked to build the Greyball tool—let’s assume you knew it would be used to avoid regulations—which of the following guidelines from the NSPE code of ethics should you apply?
- Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve
  - Engineers shall advise their clients or employers when they believe a project will not be successful
  - Engineers shall avoid conduct or practice that deceives the public
  - Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action**
7. According to the article, “When Uber moved into a new city, it appointed a general manager to lead the charge. This person, using various technologies and techniques, would try to spot enforcement officers.” In hierarchical organizations like a corporation, the distribution of blame and responsibility is not always clear. Which of these conditions is necessary to be able to allocate moral responsibility to these general managers?
- They could foresee that their actions would allow for violating regulations.
  - They would be fired if they disobeyed orders.
- Only I**
  - Only II
  - Both I and II
  - Neither I nor II

8. In the context of a company like Uber it is hard to determine who is responsible for any moral wrong-doing, this is because of:
- a. This organization functions in the context of the market, and as such has responsibilities to its shareholders
  - b. The problem of the many hands, which denotes the mismatch of collective and individual responsibility**
  - c. Greyballing is a radical design that cannot be covered by an existing regulatory framework
  - d. It is the customer who determines the use of a technology, not the company
9. Which of the following criteria needs to be taken into account while distributing responsibilities?
- I. Moral fairness
  - II. Effectiveness requirement
  - III. Product liability
- a. All three criteria
  - b. I and II, not III**
  - c. I and III, not II
  - d. II and III, not I
10. In predicting and controlling the impacts of new technologies, we are faced with a problem: it is often hard to predict the consequences of technologies during their early development. However, once the negative consequences do emerge, it is often very difficult to change the direction of technological development. This problem is referred to as:
- a. The problem of many hands
  - b. The Collingridge dilemma**
  - c. The no harm principle
  - d. The precautionary principle

## 2016 Could Be the Year Space Tourism Takes Off

This text accompanies question 11-20

Based on: <http://observer.com/2015/09/2016-could-be-the-year-space-tourism-takes-off/>

Until now Space Tourism means very rich people paying very large sums of money to ride Russian rockets on relatively short trips to the International Space Station (ISS). The last man to take such a voyage was Guy Laliberté, Canadian founder of Cirque de Soleil, in September 2009.

Meanwhile another form of Space Tourism, suborbital rocket flights, may soon be available to people who are merely really rich will be able to buy rides into space. As traditionally defined space begins 50 kilometers above the Earth's surface, thus a rocket that takes passengers to that altitude or beyond, is taking them into space. Even without going into orbit, the new Space Tourists will not only experience weightlessness, but will look down on Earth from space, a view that all who've seen it concur that it is one of the most beautiful and amazing things they've ever seen.

Virgin Galactic, a spin off from Richard Branson's Virgin group, is building a new copy of the Space Ship Two (SS2) design after the first one crashed near Mojave California last year killing one crew member and injuring the other. An investigation by the National Transportation Safety Board (NTSB) determined that the co-pilot triggered the 'feathering' mechanism too soon. This mechanism, which slows down the rocket-plane, is the key to the successful operation of the vehicle. The concept was proved on Space Ship One which won the 10 million dollar Ansari X Prize in October 2004.

Meanwhile VG's competition is making progress. Xcor Aerospace, based, at least for now in Mojave, is steadily working away on their Lynx two-seat rocket-plane. This craft is designed to take off directly from a runway and blast its way to 200,000 ft altitude, and then glide back to Earth. Each flight will carry a pilot and one paying passenger who will be charged a little less than \$100, 000 for the trip. Xcor soon hopes to be able to fly more than twice daily.

The Lynx design is relatively conventional, using a fairly simple system fueled by liquid Oxygen and Kerosene. On the other hand Space Ship Two is equipped with a unique hybrid engine powered by what can only be described as a combination of a rubber compound and laughing gas nitrous oxide. Ever since the accident in July 2007, which killed three Scalded Composite employees during a ground test, hundreds of tests have been carried out, both on the ground and, before the 2014 crash, in flight.

As Space Tourism grows, trips will be limited to people who are both wealthy and healthy, but, as with any new industry, eventually the experience will be affordable by the broad middle class. As of now less than six hundred humans have flown into space, sometime soon expect that number to increase dramatically. When millions of ordinary people have friends or relations who've gone into space, will humanity look out into space with the same awe and wonder that we now do? Perhaps people will come to view the Moon, Mars and the rest of the Solar System as just part of our neighborhood?

11. When assessing whether space tourism is unacceptably risky, it is more important to avoid:
- Type I errors, because one does not want to interpret a hypothesis as knowledge unless there is strong evidence for it
  - Type I errors, because risk assessment is always both theoretical and practical
  - Type II errors, because avoiding these is one of the fundamental goals of any scientific investigation
  - Type II errors, because risk assessment is meant in part to guide decisions that protect the public from certain dangers**
12. Which of these is not an ethical question that should be taken into account when assessing the risks of space tourism?
- How do the benefits of space tourism compare to its risks?
  - Are the potential risks and benefits of space tourism distributed fairly?
  - Is space tourism riskier than other leisure activities that people do voluntarily?**
  - Do space tourists understand and consent to the risks involved?
13. Suppose Virgin Galactic sent a questionnaire to its potential customers, asking “How much would you be willing to pay to ensure a certain level of safety during your flight?” This would be an example of:
- Contingent validation**
  - The precautionary principle
  - Value sensitive design
  - Multiple criteria analysis
14. In which of the design process (six in total) are the design requirements formulated?
- Conceptual design phase
  - Problem analysis and formulation stage**
  - Prototype development stage
  - Simulation stage

15. The two companies opt for different kinds of rockets, which indicates that they have made a different trade-off between relevant values. Which of the following concepts is not a method for making value trade-offs?
- a. Establishing thresholds
  - b. Value sensitive design
  - c. Multiple criteria analysis
  - d. The precautionary principle**
16. After reading this article, your friend says: “Surely the recent Virgin Galactic crash and the Scaled Composite accident prove that engineering issues are at the heart of understanding the risks of space tourism; therefore engineers, rather than rich business magnates, should make decisions regarding this industry.” Your friend has, unfortunately, fallen prey to the:
- a. Technocratic fallacy**
  - b. Sheer size fallacy
  - c. Delay fallacy
  - d. Wishful thinking fallacy
17. “When millions of ordinary people have friends or relations who’ve gone into space, will humanity look out into space with the same awe and wonder that we now do?” Why might this question prove problematic for a utilitarian analysis?
- a. It presupposes that aesthetics have instrumental value
  - b. It presupposes that aesthetics have intrinsic value**
  - c. It presupposes that the intensity of aesthetic pleasure cannot be determined
  - d. It presupposes that where aesthetics is concerned, Kantian good will is more important than utility
18. Space tourism is shown as a private enterprise. Which of the following arguments about the relation between risks and markets is correct?
- a. A market provides perfect information to people about possible risks
  - b. A market gives all actors a similar ability to agree with certain personal risks**
  - c. In markets, monopolies that reduce the freedom of choice cannot exist
  - d. Markets distribute risks justly over a collective

19. The article claims that space tourism will be for the time being limited to rich people, but 'as with any new industry, eventually the experience will be affordable by the broad middle class'. This claim is an example of which kind of argument?

- a. **Inductive argument**
- b. Proof from the absurd
- c. Plausibility principle
- d. Modus Tollens

20. During tests Virgin's space ships crashed which led to the loss of life. The use of test pilots is one way to manage technological risks, another for doing so is using test animals. Read the following statements about the acceptability of using humans or animal in tests.

- I. Animals cannot consent in testing, so their use is considered to be unacceptable
- II. Every human is an end in itself, so the use of test pilots is unacceptable.

Which of these statement is in line with Kantian ethics?

- a. Only I
- b. **Only II**
- c. Both I and II
- d. Neither I nor II

## Building Global Community

This text accompanies question 21-30

Mark Zuckerberg – 16 February 2017

<https://www.facebook.com/notes/mark-zuckerberg/building-global-community/10154544292806634>

To our community,

On our journey to connect the world, we often discuss products we're building and updates on our business. Today I want to focus on the most important question of all: are we building the world we all want? History is the story of how we've learned to come together in ever greater numbers -- from tribes to cities to nations. At each step, we built social infrastructure like communities, media and governments to empower us to achieve things we couldn't on our own.

Today we are close to taking our next step. Our greatest opportunities are now global -- like spreading prosperity and freedom, promoting peace and understanding, lifting people out of poverty, and accelerating science. Our greatest challenges also need global responses -- like ending terrorism, fighting climate change, and preventing pandemics. Progress now requires humanity coming together not just as cities or nations, but also as a global community.

This is especially important right now. Facebook stands for bringing us closer together and building a global community. When we began, this idea was not controversial. Every year, the world got more connected and this was seen as a positive trend. Yet now, across the world there are people left behind by globalization, and movements for withdrawing from global connection. There are questions about whether we can make a global community that works for everyone, and whether the path ahead is to connect more or reverse course.

This is a time when many of us around the world are reflecting on how we can have the most positive impact. I am reminded of my favorite saying about technology: "We always overestimate what we can do in two years, and we underestimate what we can do in ten years." We may not have the power to create the world we want immediately, but we can all start working on the long term today. In times like these, the most important thing we at Facebook can do is develop the social infrastructure to give people the power to build a global community that works for all of us.

For the past decade, Facebook has focused on connecting friends and families. With that foundation, our next focus will be developing the social infrastructure for community -- for supporting us, for keeping us safe, for informing us, for civic engagement, and for inclusion of all.

Bringing us all together as a global community is a project bigger than any one organization or company, but Facebook can help contribute to answering these five important questions:

- How do we help people build supportive communities that strengthen traditional institutions in a world where membership in these institutions is declining?
- How do we help people build a safe community that prevents harm, helps during crises and rebuilds afterwards in a world where anyone across the world can affect us?
- How do we help people build an informed community that exposes us to new ideas and builds common understanding in a world where every person has a voice?
- How do we help people build a civically-engaged community in a world where participation in voting sometimes includes less than half our population?
- How do we help people build an inclusive community that reflects our collective values and common humanity from local to global levels, spanning cultures, nations and regions in a world with few examples of global communities?

My hope is that more of us will commit our energy to building the long term social infrastructure to bring humanity together. The answers to these questions won't all come from Facebook, but I believe we can play a role.

Our job at Facebook is to help people make the greatest positive impact while mitigating areas where technology and social media can contribute to divisiveness and isolation. Facebook is a work in progress, and we are dedicated to learning and improving. We take our responsibility seriously, and today I want to talk about how we plan to do our part to build this global community.

## 21. Match the statements to normative ethical theories

- I. "This is a time when many of us around the world are reflecting on how we can have the most positive impact."
  - II. "My hope is that more of us will commit our energy to building the long term social infrastructure to bring humanity together."
  - III. "How do we help people build a safe community that prevents harm?"
  - IV. "Progress now requires humanity coming together not just as cities or nations, but also as a global community."
- a. I and II are Utilitarian, III and IV Deontological
  - b. I and III are Utilitarian, IV and II Deontological**
  - c. I and IV are Utilitarian, II and III Deontological
  - d. I is Utilitarian, II,III and IV Deontological

22. In which respect does the moral theory of care ethics differ from deontology and utilitarianism?

- a. **While deontology and utilitarianism focus on general moral principles, care ethics emphasizes the importance of direct relationships**
- b. While deontology and utilitarianism cannot be applied to engineering practices, care ethics allows a social ethics of engineering
- c. Unlike deontology and utilitarianism, care ethics cannot be seen as a version of applied ethics
- d. Unlike deontology and utilitarianism, care ethics is explicitly aimed at realizing the good life

23. Can you indicate which of the following claims about virtue ethics are correct?

- I. Virtue ethics takes the character of an individual actor as its point of departure
  - II. Virtue ethics focusses on practical reasoning, instead of theoretical reasoning
- a. Only I
  - b. Only II
  - c. **Both I and II**
  - d. None

24. Read the following statement:

“Today I want to focus on the most important question of all: are we building the world we all want? History is the story of how we've learned to come together in ever greater numbers -- from tribes to cities to nations. At each step, we built social infrastructure like communities, media and governments to empower us to achieve things we couldn't on our own. [...] Our greatest challenges also need global responses -- like ending terrorism, fighting climate change, and preventing pandemics. Progress now requires humanity coming together not just as cities or nations, but also as a global community.”

Is this argument based upon a fallacy?

- a. Yes, the naturalist fallacy; it is natural that people come together, and therefore it is ethically right we do so in greater numbers is a fallacy
- b. **Yes, on a naturalistic fallacy; that we have come together in greater numbers doesn't mean we should; facts are confused with moral progress**
- c. No, Zuckerberg makes a valid deductive argument; because we have always come together in greater numbers and need global solutions it is now right to do so.
- d. No, Zuckerberg makes a valid analogy; as our problems are now global, we must come together as a global community.

25. Facebook has written this statement in reaction to accusations of facilitating 'fake news', and providing the platform through which Russia was able to intervene in the democratic process of the United States. Larger worries about virtual communities replacing physical communities have also plagued the company, such as the online 'balkanization' and the 'living in a bubble' that Facebook facilitates by allowing users to self-select information and 'friends' that are to their liking. What kind of ethical behaviour is Facebook displaying now that they have published the statement?
- Collective responsibility
  - Separatism
  - Corporate liability
  - Active responsibility**
26. Facebook sets out to build 'supportive, safe, informed, civically engaged and inclusive communities', and gives example of how to achieve that. Rereading those points, which engineering ideals is the company using?
- Technological enthusiasm, effectiveness and efficiency, and human welfare
  - Only technological enthusiasm
  - Technological enthusiasm and human welfare**
  - Human welfare and effectiveness and efficiency
27. In one of his questions, Mark Zuckerberg talks about the prevention of harm. What is the 'no harm principle' that is introduced by J.S. Mill?
- Technologies should not harm people
  - We should not be free, as freedom leads to harm
  - One should treat others never as means only
  - One is free to do as one wishes as long as no harm is done to others**
28. In conflicts between countries which have different cultures, one often finds references to moral relativism. What does that imply?
- Different cultures adhere to different moral systems, each of them is legitimate**
  - Different cultures adhere to different moral systems, although only one of these is legitimate
  - There is one moral truth, however, this can never be substantiated in a culture, only in reason
  - The outcome of the conflict will decide whose moral system is most legitimate

29. Read the following quotations from Zuckerberg's text.

- I. 'We help people build supportive communities that strengthen traditional institutions in a world where membership in these institutions is declining'
- II. 'We help people build [a] community that reflects our collective values and common humanity'

How would you characterize these quotations?

- a. **I implies moral relativism, II implies moral absolutism**
- b. I implies moral absolutism, II implies moral relativism
- c. Both I and II imply moral relativism
- d. Both I and II imply moral absolutism

30. The global community that Zuckerberg aims to build by developing technology, can be seen as a societal experiment. Read the following statements.

- I. We cannot just stop the development once it has begun, even if it goes wrong
- II. The risks are developed during the actual implementation in society

Which of these statements is correct?

- a. Only I
- b. Only II
- c. **Both I and II**
- d. None