

2023 Note:

- Due to the pandemic, this exam was a 3 hour take home exam. It is longer than our in class exam will be. However, the questions are representative of what you can expect to see.

MICROECONOMICS

EXAM #1

October 6, 2020

Professor Justin Wolfers

There are 7 questions, worth a total of 120 points, and this exam counts as 12% of your final grade. Once you begin this quiz, you will have three hours to complete it. You must complete the exam within the 24 hour period of October 6, EST.

Timing

Once you begin, you will have three hours to both complete this exam and to upload your answers. We expect the exam itself to take closer to two hours, although some students may take longer. Either way, make sure to leave yourself sufficient time at the end to scan and upload your hand-written answers. It may help to set a timer on your phone or computer when you open the exam.

This implies: We anticipate students earning about one point per minute, but there's enough of a buffer that you could proceed at a rate of $1\frac{1}{4}$ points per minute, and still have half an hour left to deal with scanning and uploading. Completing the exam at this pace will be relatively comfortable if you aren't constantly looking things up, but it will be very difficult if you're constantly referring to external material.

Show your work

Please explain your answers and show your work. The answer alone is not sufficient – you will also be graded on the quality of your reasoning. It is in your best interest to show each of your steps clearly in order to receive partial credit and so that you are not penalized in later parts for mistakes in earlier ones. If you're stuck on a specific question, take the opportunity to demonstrate that you understand the general principles being examined.

Good luck!

MIDTERM EXAM #1

Question 1 [10 points]

Avril is a student at the University of Washington in Seattle. To offset the costs of her schooling, Avril is considering driving for Uber beginning in January 2021. She hasn't taken economics and comes to you for advice on how to decide how many trips she should aim to drive each week.

What would you tell her? Use the four core principles to help her think about the steps she should take to make her decision. Make sure to first define and describe each principle before you then apply it.

Finally, draw the threads of your analysis together to describe a simple "rational rule for Uber drivers" that Avril could follow when deciding how many hours to drive for.

Question 2 [16 points]

A few weeks into Microeconomics, your friends are already impressed by your rigorous thinking and ability to bring economic insights into everyday life. Read the following statements and indicate whether they are economically valid or invalid and why.

- a) Despite the coronavirus spreading through Spring 2020, Florida hotels and businesses remained open. Therefore, many U.S. university students decided not to cancel their Spring Break travel plans to Florida. One college student who opted to travel to a Spring Break festival in Florida said that “they knew the risk of attending, but said they did not want to lose the money they had spent on tickets. They did not blame organizers for holding the festival, and pointed to mixed messages from local officials.”

Evaluate whether this statement is economically valid or invalid and why. [2 points]

- b) Your friends Nikki and Kahlea are debating buying new video game consoles. Nikki says she will wait and see what consoles her friends buy before choosing. Meanwhile, Kahlea says “No, you’re thinking about it all wrong. It doesn’t matter what consoles your friends get. Choose the console that will bring you the most joy and offers the most bang for your buck!”

Evaluate whether Kahlea’s claim is economically valid or invalid and why. [2 points]

- c) After 8 weeks of lockdowns, the Mayor of a U.S. city is considering reopening the city. He says, "In recent weeks, we've passed scores of regulations, first closing bars, then restaurants, then offices, then schools, and then public parks. When my team adds it all up, they conclude that the total cost of the economic devastation caused by these restrictions outweighs the estimated benefits. Therefore, we should end the lockdown by repealing all of these restrictions immediately!"

Evaluate whether the Mayor's claim is economically valid or invalid and why. [2 points]

- d) Wes loves making handmade quilts - perfect for the cold Michigan winters. Knowing this, Wes's roommate, Ryan, offered to pick up some fabric while out running errands.

Wes texted Ryan: *"Thank you! If the price of fabric is \$30 per roll, please pick up one. But if fabric costs \$20 per roll, then buy two rolls. And if they're having a sale, and fabric is \$12 per roll, please buy three rolls!"*

Ryan responded: *"Are you sure? You're more willing to spend more on two rolls of fabric than three?! That sounds irrational to me..."*

Evaluate whether Ryan's logic is economically valid or invalid and why. [2 points]

e) You rent a lake house in Northern Michigan with friends for a long weekend. When you arrive, you begin to think about the activities you'd like to do while there. You have the option to rent kayaks to paddle on the lake or rent bikes to ride around town. Kayaks and bikes each seat one rider. Kayaks cost \$10 per hour, and bikes cost \$8 per hour. Jon argues that this is an easy decision: "Bikes are cheaper, so we should obviously bike!"

Evaluate whether Jon's claim is economically valid or invalid, and why. [2 points]

f) True story: In his explanation for why he continued to teach Microeconomics during the GEO strike, Professor Wolfers wrote in a message to the class that: "My decision to continue teaching reflects a recognition that many of my students have made sacrifices to be at Michigan, paying high tuition, and moving across the country in many cases. Faculty and staff have made enormous sacrifices over the summer to give students the opportunity to have a productive semester."

Evaluate whether his reasoning was economically valid or invalid, and why. [2 points]

g) Another true story: Professor Wolfers had been running for over three hours when he hit the 20 mile point of the 26.2 mile Stockholm Marathon. Everything hurt, and he thought about dropping out. "Keep going," he said to himself, "You now have the chance to earn a marathon finisher's medal for the very cheap price of only an extra 6.2 miles, which is much less than the usual price of 26.2 miles."

Evaluate whether his reasoning was economically valid or invalid, and why. [2 points]

h) Another true story: Professor Wolfers had been running for over three hours when he "hit the wall" — a point of utter exhaustion — at the 20 mile point of the 26.2 mile Marine Corps Marathon, in Washington, DC. "Keep going," he said to himself, "after all, you've already invested over three hours in this project."

Evaluate whether his reasoning was economically valid or invalid, and why. [2 points]

Question 3 [12 points]

As the COVID-19 crisis has pushed traditionally in-person education into online and hybrid formats, University Presidents across the country, including the University of Michigan's own President Schlissel, are attempting to anticipate long-term changes in the market for *in-person* instruction.

Name four factors that might alter the market for in-person instruction in the 2020-2021 school year. For the factors you name, explain whether it will shift the supply or demand of in-person instruction, whether it will cause an increase or a decrease, and assess the likely impact on the quantity of in-person instruction offered, and the corresponding price at which in-person instruction is offered.

(To be clear: We are asking you to assess the impact of each factor separately — we're not asking for their cumulative effect. You should assume that the higher education market is a competitive market that can be appropriately described by our usual supply and demand curves.)

Question 4 [5 points]

Marcelo, who owns a fabric store, recently started sewing cloth face masks and selling them at the check-out counter. He sews all of his masks by hand in the rear office of his store during his lunch break.

- a) Marcelo is selling his masks at \$10 each. They are so popular that he has decided to increase production. To do so, he could pay two of his friends to help him. They're each available to dedicate five hours each week to helping him sew masks, and would work at a wage of \$15 per hour. Each friend can each hand-sew 3 facemasks in one hour. Marcelo is considering using his scarce funds to rent sewing robots instead, at a price of \$30 per hour. These sewing robots can sew 10 face masks per hour.

Should Marcelo pay his friends to help him sew masks, or should he rent sewing robots instead? [3 points]

- b) List some of the most important variable costs that Marcelo's mask-selling business likely faces. [2 points]

- c) List some of the most important fixed costs that his mask-selling business faces. [2 points]

- d) Your manager says that potential moviegoers in rural areas were not particularly worried about catching COVID-19, while potential moviegoers in urban areas were very worried. Compare the likely size and direction of the effects on prices and quantities of movie tickets in urban areas with the likely size and direction of the effects on prices and quantities of movie tickets in rural areas. Which will see a larger change in price (and in what direction)? Will urban or rural markets see a larger change in quantity (and in what direction)? [4 points]

Question 6 [42 points]

At the start of the COVID-19 pandemic, many health facilities were unable to acquire the necessary PPE (Personal Protective Equipment) for their staff. This was in part due to surging demand for PPE, especially masks, that caused a shortage across the United States.

- a) Use a graph to illustrate the market for masks during the peak of the PPE shortage caused by the coronavirus pandemic. Specifically, illustrate market conditions after the surge in demand, but before the market price has had time to adjust. Make sure to fully label the graph and show the pre-surge equilibrium, and the shortage of PPE that resulted before the price had time to adjust. [6 points]

- b) One policymaker argued that, given the importance of ensuring that masks are affordable to all, the government should make it illegal for sellers to raise the price of masks. Describe three ways in which buyers and sellers might react to this law that would raise the “effective price” of masks. [6 points]

- c) The policy proposal to prevent price changes was defeated. Given that the price is free to adjust, describe how you expect the price to respond to this mask shortage, and the response of both buyers and sellers to this change in price. Will those price changes cause a shift in supply? Will they cause a shift in demand? On your graph illustrate the eventual equilibrium, and highlight or describe changes in the quantity demanded and quantity supplied as the market adjusts. [4 points]

- d) Which do you think is more elastic: The price elasticity of demand for masks, or the price elasticity of supply? Explain your answer. [4 points]

Question 7 [19 points]

During your internship at the World Health Organization (WHO), you were tasked with studying trends in a new approach to healthcare called “personalized medicine,” which encompasses all health services that can be better tailored to individual patients based in part on their genetic (DNA) makeup. The reports that you’ve read all suggest that the price of these services will decline over the next few years, but they each give a different explanation for why:

- **Report 1:** The change in personalized medical costs is primarily driven by advancements in DNA sequencing methods that enable faster and cheaper “decoding” of an individual’s genetic code.
 - **Report 2:** The main factor changing personalized medicine is the ageing population of high income countries. Older populations are more likely to suffer from ailments whose treatment requires in-depth knowledge of their genetics.
 - **Report 3:** Recent suspicion among patients rights groups about the privacy threats related to emerging technologies, like genetic sequencing, will cause prices of personalized medicine to decrease in the near future.
- a) Draw three graphs illustrating the rationale of each report (and to be clear, we are characterizing this as a perfectly competitive market). Make sure to highlight any changes in supply, demand, price and/or quantity. [9 points]

b) Do all of these reports offer feasible explanations for why the price of services will decline over the next few years, or does economic reasoning suggest that one or more of them are wrong? Explain. [2 points]

c) What kind of economic data could you gather to confirm which report is correct? How might you use these data to make your inference? [4 points]

d) Personalized medicine requires cutting-edge data analysis and machine learning techniques to process the massive amounts of genomic data necessary to develop treatments. In fact, many of the data science innovations from personalized medicine can be used in other computing-intensive fields. Given the projected changes in personalized medicine, what can be expected to occur in related fields that might also use these data science innovations? Does this outcome depend at all on whether the arguments in Report 1, 2, or 3 are correct? [4 points]