ECON 001
Spring 2022
Midterm 2
March 29, 2022
Time Limit: 60 Minutes

Name (Print): _____

Penn ID number: _____
(8 digits)

- This exam contains 8 pages (including this cover page) and 9 questions. Check to see if any pages are missing.
- The exam is scheduled for 1 hour.
- The total score is 25 points.
- This is a closed-book, closed-note, no calculator exam.
- Answer each multiple-choice question by filling in the bubble for the answer you select. Make sure that the bubble is clearly filled in, or it will be marked incorrect.
- Write your answers to the short answer questions in the spaces provided for them. Do not write your answers outside of the boxes.
- Do not remove any pages or add any pages. No additional paper is supplied
- Show your work when asked. Label all graphs carefully.
- This exam is given under the rules of Penn's Honor system.

My signature certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination.

Please sign here _____ Date _____

Multiple Choice Questions (best 6 out of 7: 9 points)

1. (1½ points) Suppose the market for A/C units in Philadelphia has an upward sloping supply and downward sloping demand. The market is currently in the short run equilibrium with a price P such that $P > \min ATC$. The mayor of Philadelphia, worried about a heat wave in the upcoming summer, is considering a price ceiling such that $P_C = \min ATC$. Which of the following would be a consequence of the policy?

   I. In the short run, the quantity of A/C units sold will decrease.

   II. In the long run equilibrium, consumer surplus will be lower than without a price ceiling.

   ◯ I. only

   ◯ II. only

   √ **Both I. and II.**

   ◯ Neither I. nor II.

2. (1½ points) The government considers introducing a price floor for milk. Their objective is to increase producer surplus. Suppose the demand for milk is given by $P = 20 - Q_d$ and supply by $P = Q_s$ where P is the price of milk per gallon. Which policy would unambiguously help the government to reach their goal?

   ◯ Set any price floor above $P = 10$

   √ **Set the price floor such that consumers demand 5 gallons of milk.**

   ◯ Do not impose a price floor since producer surplus is maximized without a price floor.

   ◯ Set the price floor at $P = 5$, where quantity demanded will be strictly larger than the equilibrium quantity without a price floor.

3. (1½ points) Suppose that the Mayor of Taxatown is considering imposing a per-unit tax, without generating any inefficiency. She is running for reelection and her campaign is largely financed by the city's business owners, so she wants sellers to keep the same price as before the tax. She should impose a tax in a market where:

   √ **Demand is perfectly inelastic and supply is upward sloping**

   ◯ Demand is perfectly elastic and supply is upward sloping

   ◯ Supply is perfectly inelastic and demand is downward sloping

   ◯ Supply is perfectly elastic and demand is downward sloping

4. (1½ points) Consider the market for peaches in the U.S., where demand is $P = 20–2Q_D$ and supply is $P = 2Q_S$ (P is measured in dollars per pound). The world price of peaches is \$8 per pound. To protect domestic farmers, the U.S. government imposes a tariff of \$4 per pound on imported peaches. What is the tariff revenue for the U.S. government?

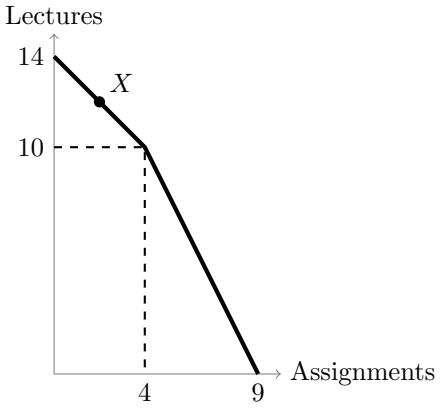
   ◯ \$60

   ◯ \$40

   ◯ \$20

   √ **\$0**

5. (1½ points) Anne and Daniel each have 10 hours to spend between preparing lectures and grading assignments, which they later trade in the broader UPenn ecosystem. Suppose it takes Anne 1 hour to prepare a lecture and 2 hours to grade an assignment, whereas it takes Daniel takes 2.5 hours to prepare a lecture, and 2.5 hours to grade an assignment. The following graph shows the joint PPF of the team Anne-Daniel:



Which of the following is true?

I. Anne has a comparative advantage in grading assignments.
II. At point X, Anne is not grading any assignment.
III. At point X, Daniel is not grading any assignment.

◯ I. and II.
◯ I. and III.
√ **II. only**
◯ III. only

6. (1½ points) Suppose that the market for coconuts is perfectly competitive, with demand $P = 80 - 2Q_D$ and supply $P = 2Q_S - 4$. Coconuts falling from palm trees may cause injuries on bystanders, so the marginal social cost is $MSC = 2Q$. The government is considering imposing a tax of \$4 per unit. Which of the following is a consequence of the tax?

I. The government's tax revenue is \$80
II. The deadweight loss is \$2

√ **I only**
◯ II only
◯ Both I and II
◯ Neither I nor II

7. (1½ points) Responding to traffic congestion, the mayor of Philadelphia is considering building a new bridge connecting Center City to University City. The total cost of building the bridge is \$500,000. Suppose there are 1,000 students and 1,000 faculty members who would use the bridge. Each student values the bridge at \$10 each faculty member values the bridge at \$100. Which of the the following decision would be socially efficient?

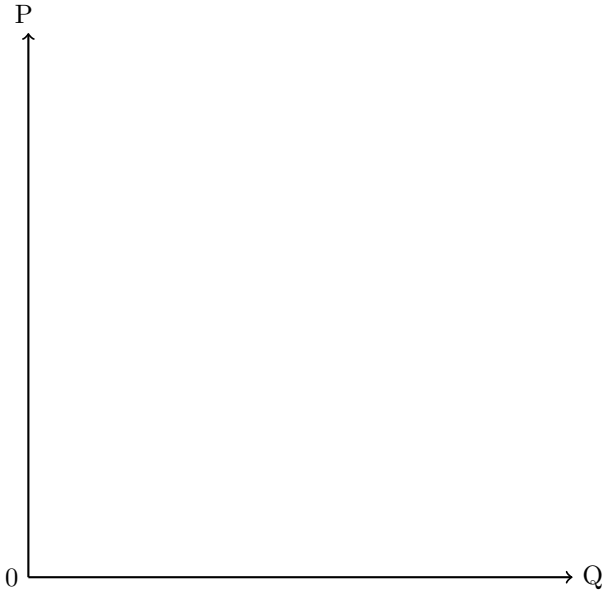
◯ Pay for the new road because the social benefit exceeds the private cost.
◯ Pay for the new road because the social benefit exceeds the social cost.
√ **Abandon the project because the social cost exceeds the social benefit.**
◯ Abandon the project because the social cost equals the private benefit.

Short Answer Questions (16 points total)

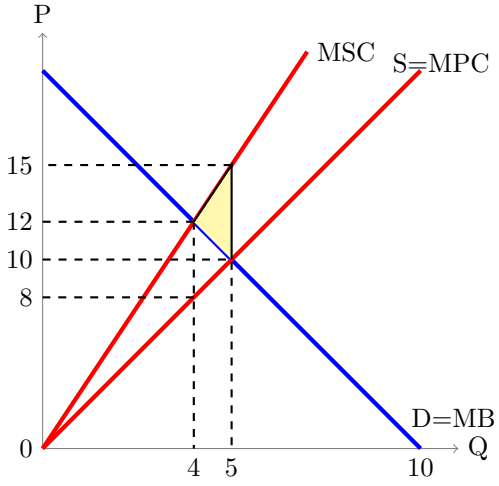
To get any point you must show your work

8. Consider the market for fertilizers, where demand is given by $P = 20 - 2Q_D$ and supply is given by $P = 2Q_S$. Fertilizer producers dump their waste into the environment, generating a negative external cost $MEC = Q$.

   (a) Draw the marginal benefit, marginal cost, marginal social benefit and marginal social cost on the graph below. Clearly label all intercepts and curves.



Solution:



The marginal social benefit equation is $MSB = MPC + MEC = 2Q + Q = 3Q$.

   (b) The market equilibrium quantity is $Q_M =$ **5** and the market equilibrium price is $P_M =$ **10**.

Solution: The equilibrium quantity is determined by the intersection of supply and demand: $20-2Q = 2Q \Rightarrow 4Q = 20 \Rightarrow Q_M = 5$. Plugging the quantity into supply or demand yields $P_M = 10$.

(c) Consider the socially efficient outcome: The socially efficient quantity is $Q_E =$ **4**.

(d) Why is the market equilibrium quantity inefficient? Explain in the box below

Solution: The socially efficient quantity is determined by the intersection of MSC and MSB: $3Q = 20 - 2Q \Rightarrow 5Q = 20 \Rightarrow Q_E = 4$. The market equilibrium is not efficient because there is a negative externality, which leads to over-production: $Q_M > Q_E$.

(e) Find the deadweight loss generated by the market, and shade in this area on the graph. Show your computations in the box below.

Solution: The deadweight loss is the triangle between MSC and MSB, between $Q_E = 4$ and $Q_M = 5$. It is equal to $\frac{1}{2} \times (15 - 10) \times (5 - 1) = 2.5$.

(f) Suppose the government wants to regulate the market in order to restore efficiency:

i. The government should impose a per-unit **tax** (tax / subsidy) equal to **4**.

Solution: The government should impose a per-tax. The tax should be equal to the marginal external benefit at Q_E, which is equal to $12 - 8 = 4$.

ii. How much revenue or expenditure will the tax or subsidy generate for the government? Show your work in the box below.

Solution: The tax revenue is equal to the per-unit tax ($t = 4$) multiplied by the quantity sold ($Q_E = 4$): $TR = 16$.

(g) Suppose that, instead of a tax or subsidy, the government wants to implement a price ceiling.

i. The government should set the price ceiling at $P_c =$ **8**.

Solution: The government should set the price ceiling at P_c such that producers supply $Q_E = 4$: $P_c = 2Q_E = 8$.

ii. What is the deadweight loss associated with the price ceiling? Explain in the box below.

Solution: There is 0 deadweight loss, because the price ceiling yields the efficient quantity.

9. Hogwarts School of Witchcraft and Wizardry is divided into four Houses: Gryffindor, Hufflepuff, Ravenclaw, and Slytherin. The following table shows how many books or snakes each house is able to produce every day:

	Gryffindor	Hufflepuff	Ravenclaw	Slytherin
Books	6	5	4	3
Snakes	2	2	4	5

(a) What are the opportunity costs of one snake for each house?

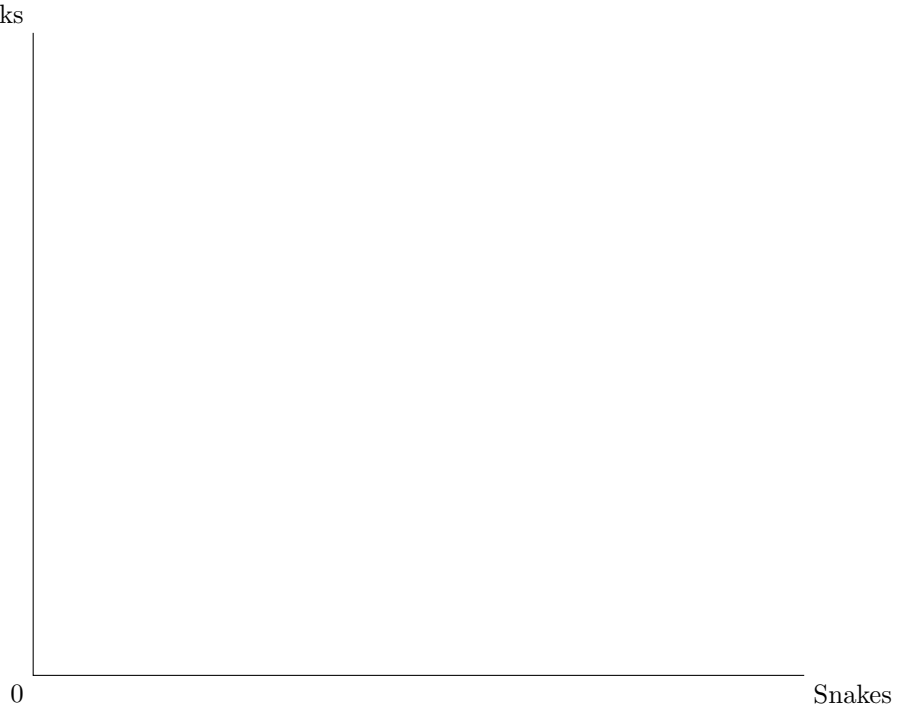
Gryffindor's opportunity cost of 1 snake is _____**3**_____ books.

Hufflepuff's opportunity cost of 1 snake is _____**2.5**_____ books.

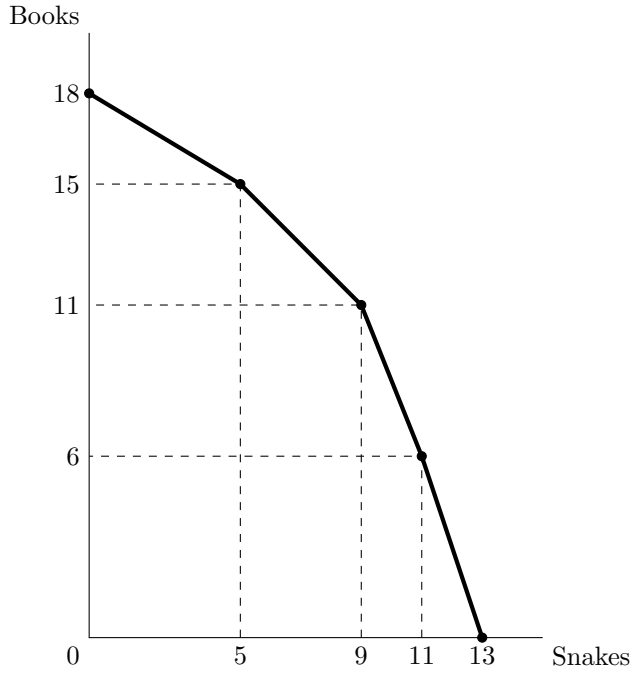
Ravenclaw's opportunity cost of 1 snake is _____**1**_____ books.

Slytherin's opportunity cost of 1 snake is _____**0.6**_____ books.

(b) Draw the joint PPF of Hogwarts on the graph below. it is fine if your graph is not to scale, but you must clearly label all kinks' coordinates and all intercept.



Solution:



(c) Suppose that Hogwarts opens up to trade with the rest of the world, and the world price of 1 snake is 2 books.

i. With trade, Hogwarts will produce **9** snakes and **11** books.

ii. Suppose Hogwarts wants to consume 15 books. It must:

- **export** (import/export) **2** snakes
- **import** (import/export) **4** books.

(d) Now let us focus on the domestic market for books in Hogwarts, where demand is given by $P = 24 - Q_D$ and supply is given by $P = Q_S + 4$. Suppose that books trade on the world market at a price of \$10.

i. In the autarky equilibrium, the price is $P_A =$ **14**

ii. After opening up to international trade, Hogwarts **imports** (imports/exports) **8** books.

iii. The Hogwarts Headmaster is considering imposing a \$2 tariff on books to protect domestic producers.

With the tariff, Hogwarts will **import** (import/export) **4** books.

iv. The Head of Gryffindor advises the Headmaster to impose a price floor at $12 instead, arguing that it will yield the same total surplus as the tariff. Do you agree with that, and why? Explain in the box below.

Solution: The Head of Gryffindor is wrong. The price floor will lead to the same level of imports as the tariff. However, there will be no tariff revenue, so total surplus will be lower.