

THE PENNSYLVANIA STATE UNIVERSITY  
Department of Economics

Economics 428  
Sample Midterm

Gallant  
Fall 2021

Directions: For the multiple choice questions, circle the letter to indicate your choices. Each question has been constructed so that there is one and only one correct or best answer. For the problems, show how you are solving each part of the problem and be as clear as you can with your answers. Partial credit will be awarded if significant progress is made towards the answer. Clearly indicate your final answer. This exam will be closed-book and closed-note, with the exception that each student may have one 8.5×11 sheet of paper with material on it. Calculators may be used. Each student must work the exam individually and independently of other students or individuals.

1. Consider two solid spheres in a vacuum that are separated by a distance much greater than radius of either of them. The first sphere has an internal heat source causing it to emit radiation at a temperature  $T$ . The second sphere has a black surface and has no heat source. What will happen to the second sphere?
  - (a) Nothing.
  - (b) The temperature of the first and second spheres will become equal.
  - (c) The second sphere will reach an equilibrium temperature that is lower than  $T$ .
  - (d) The second sphere will reach an equilibrium temperature that is the same as  $T$ .
  - (e) The second sphere will reach an equilibrium temperature that is higher than  $T$ .
2. *Externalities:* Because trucking as an industry involves the generation of pollutants in engine exhaust,
  - a) the supply curve of trucking services overstates the true cost of providing those services.
  - b) the supply curve of trucking services understates the true cost of providing those services.

- c) the demand curve for trucking services overstates the true benefit of providing those services.
- d) the demand curve for trucking services understates the true benefit of providing those services.
- e) the market for trucking services will always be away from equilibrium by an amount equal to the value of the externality.

3. *Coase*: The Coase Theorem states that:

- a) regardless of how property rights are assigned, the outcome will be socially efficient if transaction costs of bargaining are zero and all other conditions for a competitive equilibrium are in place.
- b) if property rights are assigned to the party imposing a negative externality on society, an efficient outcome is achievable.
- c) efficiency can be achieved when a single owner manages the common property resource.
- d) with incomplete information, standards are more efficient than emissions fees.
- e) none of the above is correct

4. *MEC*: When peach canners (a competitive industry) process fresh peaches, they produce three products. The first, canned peaches, is sold in the marketplace. The others, liquid and solid wastes, are by-products that must be removed. The liquid is sometimes temporarily kept in holding ponds and later released into a nearby stream or sewer. Liquid dumped in the stream represents a negative externality to downstream users. In the peach growing region, the marginal external costs of the canning process have been estimated as:

$$MEC = 0.000043Q,$$

where  $Q$  represents output of canned peaches in cases per week. The marginal cost of canning peaches (ignoring MEC) is:

$$MC = 2.00 + 0.000157Q,$$

and the demand for canned peaches is:

$$P = 9.00 - 0.000243Q.$$

- (a) How many cases of peaches will be produced per week during the growing season, and what will the selling price per case be if producers ignore the costs imposed on others?
  - (b) If producers are forced to incorporate the marginal external costs into their production decisions, what will the new production rate and selling price be?
  - (c) In taking account of the external costs imposed on others (part b), what was the impact on the selling price and production rate of canned peaches? Explain the impact on market efficiency.
5. *Public goods:* Three retailers, a florist, a general store, and a shoe store, share a common parking lot and entryway. An investment of  $I$  dollars in improvements to the common areas has marginal benefits to all three retailers as follows:

$$\begin{aligned} \text{florist} & : MB = 4 - 0.4I \\ \text{general store} & : MB = 15 - I \\ \text{shoe store} & : MB = 5 - 0.5I. \end{aligned}$$

The marginal cost of the investment is 1.

- (a) Graph the individual and total marginal benefits along with the marginal cost.
  - (b) Calculate the efficient investment level.
  - (c) What level of investment would the retailers provide?
6. *Coase:* If  $P_1 = 13$  and  $P_2 = 10$  for the example considered in class to illustrate Coase's Theorem, the following table results.

$P_1 = 13, P_2 = 10$	$Q_1$	$Q_2$	Profit 1	Profit 2	Total
Optimal (merge firms)	5.33	2.33			34.33
No Property Rights	6.5	0	34.25	0	34.25
Firm 1 Shut Down	0	5	0	21	21
<i>Property Rights</i>					
Polluter Pays	?	?	?	?	?
Victim Pays	?	?	?	?	?

- (a) (8 points) Fill in the cells marked with question marks.
- (b) (5 points) What is the dead weight loss due to the externality?
7. *Green Goods:* Consider the following survey results showing willingness to pay for a month's supply of green diapers such as 7th Generation and conventional diapers such as Pampers:

Consumer Type	Willingness to Pay for Diapers	
	Green	Conventional
Environmentally Sensitive	65	55
Regular	45	40

- (a) (6 points) If the price of green diapers is 45 and the price of conventional diapers is 40, which type of diapers will environmentally sensitive consumers buy and which type of diapers will regular consumers buy?
- (b) (6 points) If the price of green diapers is 50 and the price of conventional diapers is 40, which type of diapers will environmentally sensitive consumers buy and which type of diapers will regular consumers buy?
8. (15 points) Firm 1 and Firm 2 produce in competitive markets. Firm 1's output generates a negative externality on Firm 2. The price of Firm 1's product is  $P_1 = 13$

and Firm 1's cost function is  $C_1(Q_1) = Q_1^2 + 8$ . The price of Firm 2's product is  $P_2 = 11$  and Firm 2's cost function is  $C_2(Q_1, Q_2) = Q_2^2 + Q_1Q_2 + 4$ . If Firms 1 and 2 are merged, what will be the output  $Q_1$  and  $Q_2$  of the merged firm?