We encourage you to work together, but each person must submit his/her own responses. **PLEASE WRITE YOUR NAME, SID, AND SECTION NUMBER ON EACH PAGE.** Please type and/or write in pen- **ANSWERS WRITTEN IN PENCIL WILL NOT BE ACCEPTED.**

1) True, false, or uncertain. Please answer and provide a SHORT explanation, correcting if false. (Please correct in a meaningful way, not by adding the word “not.”)

   a) A market that has 10,000 sellers and 10,000 buyers is perfectly competitive.
   b) If I go around handing out flowers to people for free, then I am creating an externality and the government should take steps such as imposing a cap or a tax to correct it.
   c) When a tax is imposed to correct an externality, most of the burden falls on consumers who consume goods made by the industry creating the externality.
   d) Improving social welfare by imposing a tax on a negative environmental externality always meets the Kaldor-Hicks criterion.
   e) A Pareto-efficient allocation says nothing about equity.

2) You run the only bookstore dealing in used textbooks on a college campus. You know that a lot of students took Econ 1, and although the class was very exciting it's likely that some will want to sell back their textbooks at the end of the semester. The number of students who sell it back to you is likely to vary by the amount of money you're willing to pay for it. You decide that you don't want to be too fancy in your estimation so you'll keep it linear, and you guess that if you offer $15 you will get 20 books, and if you offer $30 you'll get about 40.

   Next you have to figure out how many you think you can sell. Let's say that the students are cheap, and you know that when you go to sell the books to the next class, the higher you price your textbook the more likely they are to buy it online. Again you decide that you don’t want to be too fancy in your estimation so you’ll keep it linear, and you guess that if you offer $80 you will sell just 40 copies, but if you sell it for $50 then 100 of them will buy it.

   I. Describe mathematically and show graphically the supply and demand “curves” (actually straight lines).

   II. Consider the case of a perfectly competitive market for buying and selling the book.
      a) How much would you (the bookstore owner) have to pay to buy the book back from students?
      b) How much could you charge when you sold it to the next class?
      c) About how many copies would you expect to sell, and what would be your total revenue?
      d) If buying the books is your only cost, what would your profit be?
III. Now consider a case in which the local post offices are terrible, and it takes hours of waiting to send a package, so you’re sure that students won’t sell their books over the Internet. If you represent the only opportunity that students have to sell their books, you have a monopsony. Assume there’s no ASUC to coordinate book sales between students, and they aren’t able to do it on their own.

a) Describe the strategy you should pursue to make the most money off of the students.

b) What is the expression describing your (total) cost for buying the books? In other words, express the total cost for buying books as a function of the quantity of books purchased.

c) What is the marginal cost to you of buying more books? (This is also called the “marginal outlay.”) Describe mathematically and show graphically the marginal outlay “curve.” (You can put it on the same graph you used for part I.)

d) How many books should you try to buy to maximize your profits?

e) What price should you offer the students to get that many books?

f) If you sell the books at the competitive price, how much do you make in total?

IV. Finally, it turns out that you have a friend in the post office who arranges to stop delivery of all textbooks to students. Now you are the only way for students to buy the book, as well as the only place they can go to sell it. Students’ willingness to sell the book and willingness to pay for the book are unchanged.

a) Describe the strategy you should pursue to make the most money off of the students. (Hint: neither the supply nor the demand curve is directly involved.)

b) How many books should you buy to maximize your profits?

c) What price should you offer the students to get that many books?

d) How much are you going to charge for the books?

e) How many will you sell at that price?

f) The post office will never change the length of time required for shipping packages, so your monopsony is secure, but your friend at the post office is asking for a cut of your profits in order to continue the moratorium on textbook deliveries. What is the most that you are willing to pay him?
3) Suppose the market for mineral water in a small isolated country is perfectly competitive. The marginal cost for mineral water production is $20+Q$, and the demand for mineral water is $P=80-2Q$, where $P$ is the dollar price, and $Q$ is the tons of mineral water produced. Suppose the processing procedure in mineral water production generates pollution, which incurs damage to the environment costing $0.5Q^2$. (The externality does not directly harm producers or consumers.) Please solve the problems below both mathematically and graphically. Please LABEL the graph clearly.

I) Calculate the marginal externality cost and marginal social cost functions, and draw them on a graph with the supply and demand curves. Please label each curve explicitly.

II) What are the competitive equilibrium price and quantity for the private sector? Is this competitive equilibrium potentially Pareto efficient? Please provide both mathematical and graphical [labeling the equilibrium “A”] solutions.

III) What is the optimal quantity and price for the whole society? Please provide both mathematical and graphical solutions [labeling this point “B”].

IV) Does the competitive equilibrium incur any dead weight loss? If so, how much? Please give the graphical solution and the mathematical solution. On the graph, please label the vertices and describe the region by them (e.g. _ABC).

V) If the government intends to impose a production tax to reach the socially optimal level of pollution, how much should the tax be? Compared to the competitive equilibrium without government intervention, how much does the government revenue change? How much does the producer surplus change? What is the change in consumer surplus? How much does the pollution cost change? Please give both graphical and mathematical solutions.

VI) (bonus question) If a pollution treatment system can be installed so that there will be no pollution costs at the competitive equilibrium, how much will a benevolent government (i.e. the government that is trying to maximize the social welfare) be willing to pay for it?

VII) Please write an essay of no more than one double spaced page in 12 point Times New Roman font (or the equivalent) addressing all of the questions below. Be sure to write your answers to these questions in the form of an essay with graphs as needed, not just in a Q&A format. **DO NOT DO ANY ADDITIONAL MATHEMATICAL CALCULATIONS** (Graphs can be on another page, but they don’t need to be. You CAN do this all in one page!).

i. Under government intervention with the production tax, who benefits, who loses, and what happens to the environment? Who bears the tax burden? Answer the questions again considering a consumption tax instead of a production tax.

ii. Given the existence of pollution, if there is no government intervention, will some level of market power be socially preferable to none? Please give an example with a relevant graph for your answer. (Hints: you can just consider either the monopoly or the monopsony case. Again, no mathematical solutions are necessary). Comment on the role of market power in social welfare.

iii. Please compare the benefits of relevant agents (consumers, producers, and government) under the two cases (production tax and presence of market power) above.