Economics 3250 Dr. Lozada
Spring 2018 Exam 1

This exam has 25 points. There are six questions on the exam. Most of the questions are worth 4 points, but one is worth 5 points.

Put your answers to the exam in a blue book or on blank sheets of paper.

You have the entire class period (80 minutes) to take this test.

Answer the questions using as much precision and detail as the time allows. *Correct answers which are unsupported by explanations will not be awarded points.*

Answer all of the following six questions.

1. **[5 points]** Figure 1 (on the next page) shows basic curves for a competitive firm; some of the graphs explicitly deal with a polluting firm. Many of the labels have been blacked-out. Fill in the missing labels. Remember to explain your work; do not merely give the right answers. Explain the abbreviations. In graph 9, one of the lines is "(fill in the blank) *plus* (fill in the blank)." In graph 10, one of the lines is "*MΠ* minus (fill in the blank)."

2. **[4 points]** In the chapter on "how governments fail the environment," we mentioned that even if a country's laws and politicians are good, there could still be a problem. What was that problem? Describe it using the language of a "principal" hiring an "agent" to perform tasks for the "principal."

3. **[4 points]** Give a simple example showing the potential effect of discounting on environmental policy. The example does not have to be one we discussed in class.

4. **[4 points]** Here are some problems we discussed with the Travel Cost Method.

   (a) time costs;

   (b) substitute sites;

   (c) the house purchase decision.

   Explain each of these and describe why it is a problem with the Travel Cost Method.

5. **[4 points]**

   (a) Explain why the Coase Theorem depends on assuming that if two parties could both gain from a trade, they will make that trade.

   (b) Why might that assumption fail?

6. **[4 points]** Explain what a "deposit-refund system" is, give an example of one, and explain its effect on the environment. Your example may be a hypothetical one or a real one (either a current one or an historical one).

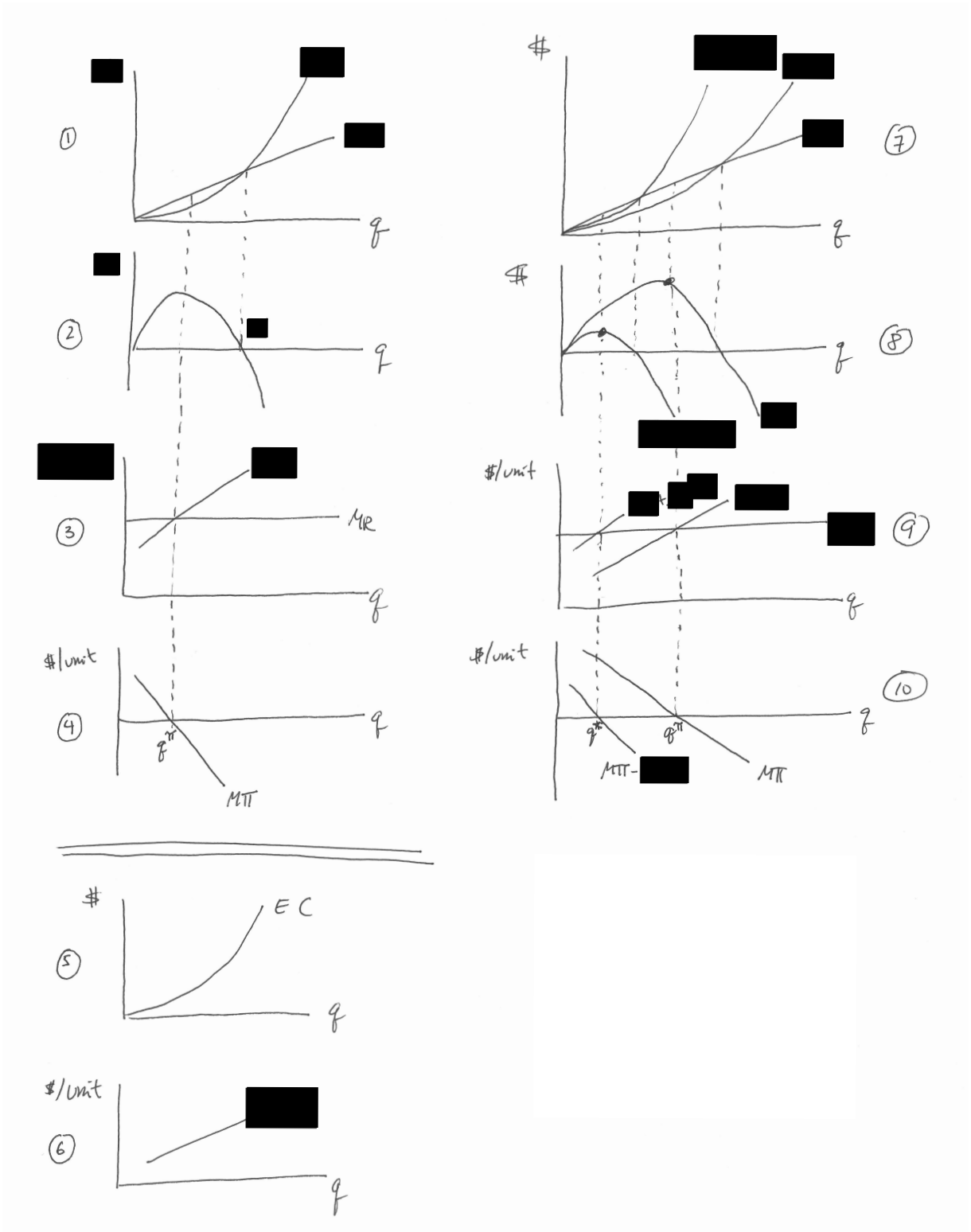

Figure 1.

Answers to Exam 1, Econ. 3250, Spring 2017

1. Graph 1: The horizontal axis is quantity of output. The vertical axis is dollars. Total revenue is a straight line from the origin assuming a competitive firm, because under that assumption, total revenue, which is price times quantity, is a constant times quantity, and a mathematical function such as $p \cdot q$ is a straight line from the origin when p is a constant. The other line, a curve, is total cost. It is zero if $q = 0$ (if there is no production, the firm buys no inputs), then we assume it rises rapidly, a convex shape. If we assumed it rose slowly (a concave shape), bigger firms would have a cost advantage over smaller firms, smaller firms would be priced out of the market, only big firms would be left, and it would make no sense to assume firms behaved competitively because they don't (they behave strategically, they don't take prices as given).

   Graph 2: The curve is profit, which is Graph 1's total revenue minus its total cost. The vertical axis is dollars.

   Graph 3: Just as marginal revenue MR comes from Graph 1's total revenue (by calculating the slopes of tangent lines in Graph 1), marginal cost MC comes from Graph 1's total cost (by calculating the slopes of tangent lines in Graph 1). The vertical axis is dollars per unit, since the lines are marginal lines, which measure the change in dollars over the change in output.

   Graph 5: External Cost as a function of quantity of polluting output produced. If there's no production, there's no pollution and so no EC. We assume that EC rises quickly, that is, we assume that initial increments in output cause only small increases in EC, but that at large quantities of output, further increments in output cause large increases in EC.

   Graph 6: Marginal External Cost, MEC. As above, the marginal is obtained by calculating the slopes of tangent lines to EC in Graph 5.

   Graph 7: Graph 1, and an additional, higher line showing total cost plus Graph 5's EC. (That sum is total social cost.)

   Graph 8: The upper curve is Graph 2's profit. The lower curve is Graph 2's profit minus EC.

   Graph 9: Graph 3's MR and MC. Above MC is MC plus MEC.

   Graph 10: Graph 10's marginal profit, and below that, marginal profit minus MEC.

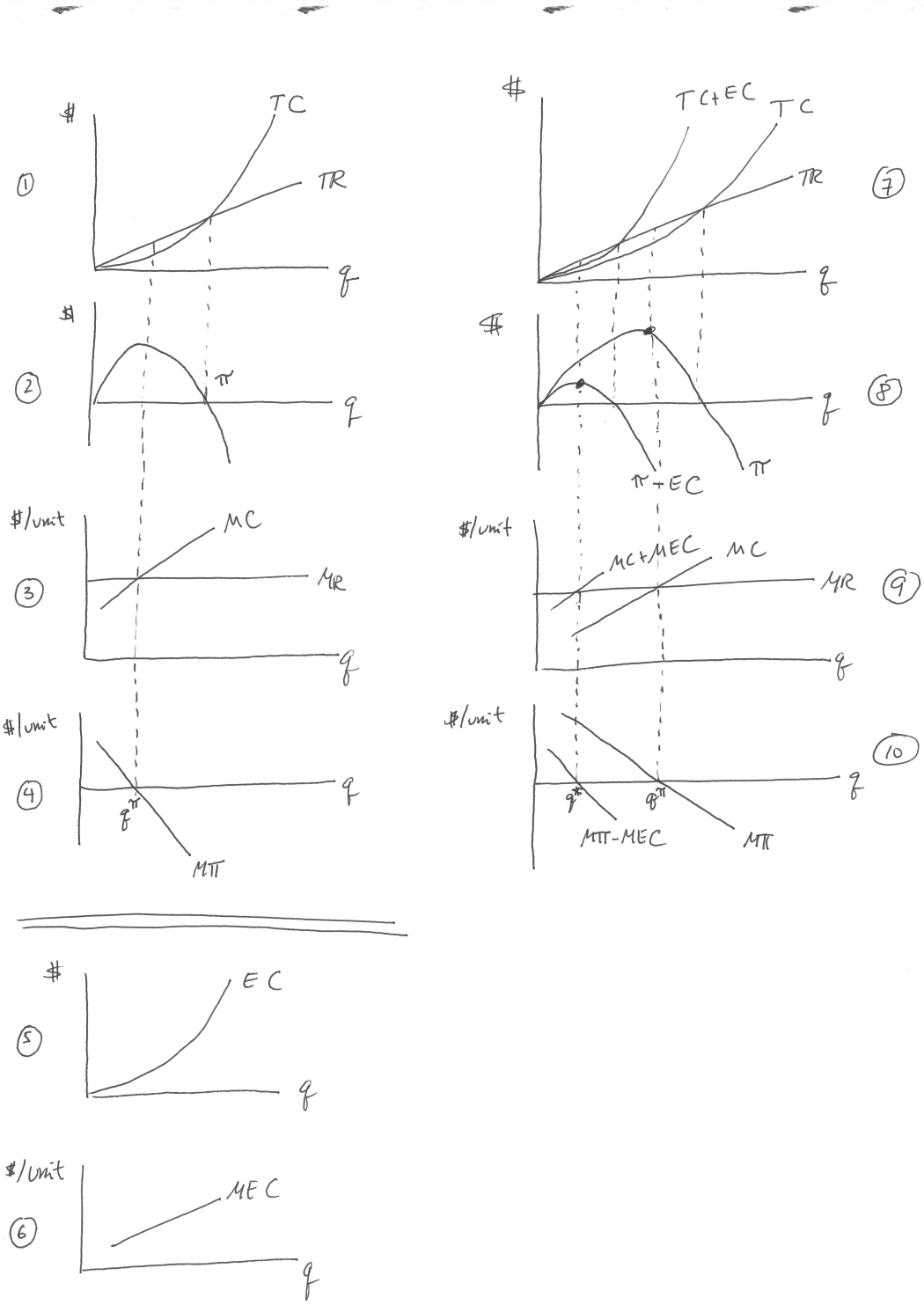
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Figure 2.

2. Even if a country's laws and politicians are good, there is another set of people who enforce laws, the civil servants (many of whom are "bureaucrats"). They are "agents" hired by the office-holders, who are the "principals," to do what the principals want done but cannot do themselves. (For example, to enforce pollution laws around an entire country.) The problem is that these agents may have different desires than the principals who hired them, and if the principals cannot monitor the agents perfectly, the agents may spend time doing what they want to do rather than what the principals want them to do. (For example, taking bribes from polluters to overlook pollution law violations.)

3. Answers will vary here. The basic idea is that the higher the discount rate, the less what happens in the future matters to current decision-making. Costs and benefits in year t are multiplied by $1/(1+r)^t$ when there is discounting, where r is the rate of discount. For large t, this fraction is close to zero, but for $t = 0$, this fraction is equal to one. For any given t, the larger r is, the smaller this fraction is.

   For example, a policy having costs now and benefits t years into the future will have a present value equal to the costs plus "$1/(1+r)^t$ times the benefits." If r is high, the benefits term will be small and will be outweighed by the costs, so the project will not be undertaken. So high r hurts projects which have costs now and benefits many years into the future.

4. (a) One of the costs of traveling to a site (say, a national park) is the wages lost by not working. This is an example of the time cost component of the travel. However, it is difficult to obtain data on time cost. If time cost is omitted then the estimated travel cost will be wrong. For example, suppose a heart surgeon and a retiree from Salt Lake City are both observed to have traveled to Yellowstone National Park to go camping. They have very similar explicit travel costs. The heart surgeon is foregoing a lot of money by traveling to the park instead of doing some more heart surgeries. (This is an "opportunity cost" of traveling to the park.) The retiree may be foregoing no money at all. So the surgeon's actual (explicit *plus* opportunity) travel costs are quite bit larger than the retiree's, but the economist who cannot get data on the costs of their time will not know this.

   (Another sort of opportunity cost is the sheer pleasure or discomfort a traveler experiences when traveling. (If the traveler enjoys

the act of traveling, the opportunity cost would be negative, not positive.) One could think of this as a "time cost," though it's not clear it fits into that category.)

(b) Imagine two travelers making a trip of equal length to the same National Park. One begins the journey from a home near several other national parks; the other begins the journey from a home near no other national parks. Their travel costs may be the same, but the first traveler probably values this National Park more because he can choose from among many closer national parks (many "substitutes"), yet he chose to visit this one. The second traveler may not like this national park very much, and only visits it because it's the only one in his vicinity.

(c) Imagine a traveler who is so impressed with a national park he visits that he decides to move near that park ("decides to purchase a house" close to that park). After the move, his travel costs to the park are very low, so an economist may think he values the park little. The economist would be wrong: he values the park so much that he moved close to it.

5. (a) Consider Figure 3. MNPB is Marginal Net Private Benefit; MEC is marginal external cost. If pollution victims have the property rights (to clear air), quantity Q of the polluting output starts out at zero. Firms would be willing and able to pay "a" or less in exchange for the right to produce the Q_1 unit; pollution victims would be accept a payment of "b" or more in exchange for allowing the firm to produce the Q_1 unit. So any price between a and b would be a "win-win" price for the right to produce the Q_1 unit. The Coase Theorem relies on such trades actually being made, so that output ends up at Q^*.

If instead of pollution victims having the property rights, the polluting firms have the property rights (to pollute as much as they please), quantity Q of the polluting output starts out at Q^π. Pollution victims would be willing and able to pay MEC or less in exchange for cleaner air; firms would be accept a payment of MNPB or more in exchange for reducing production. So, for example, if the parties have bargained to Q_2, any price between f and g would be a "win-win" price for not producing the Q_2 unit. So again, the Coase Theorem relies on such trades actually being made in order to conclude that output ends up at Q^*.

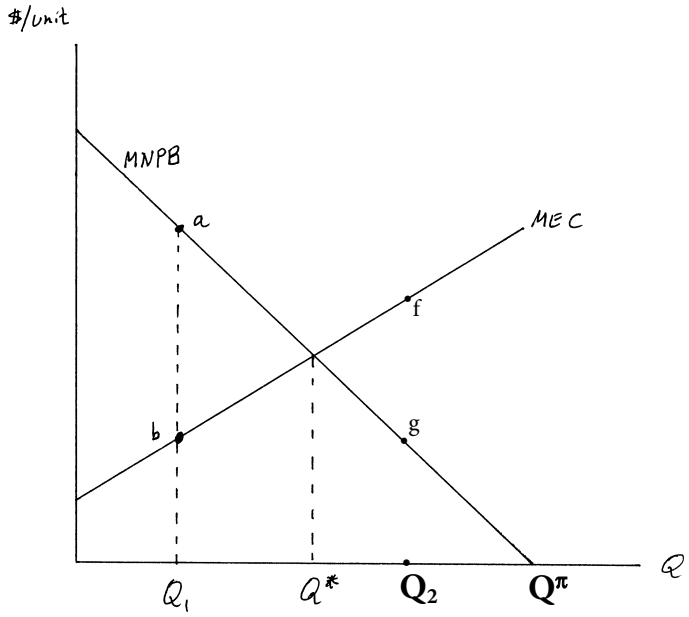

Figure 3.

(b) The parties to the bargain might decide to behave strategically. For example, supposing pollution victims have the right to clean air and the bargaining has gotten to Q_1, pollution victims might decide to reject offers a bit higher than b, to make the firm think they are tough bargainers (to get an advantage in future bargaining rounds) or to make the firm think that their MEC is higher than it really is.

Similarly, if instead the firms have the right to pollute as much as they want and the bargaining has gotten to Q_2, firms might decide to reject offers a bit higher than g, to make the pollution victims think they are tough bargainers (to get an advantage in future bargaining rounds) or to make the pollution victims think that their MNBP is higher than it really is.

If both parties behave that way, quantity might not move to Q^*; it might get stuck away from Q^*, with both sides rejecting offers that in the short run would make both of them better off.

Another reason, which was thought of before the strategic behavior reason, is bargaining costs. Especially if the number of

firms or pollution victims is great, there will be high costs to coordinate their bargaining internally within each group. There may also be high costs to engage in bargaining across groups—for example, legal fees.

6. In a deposit-refund system, a fee is added onto the purchase price of a good (such as a drink sold in a glass bottle or in an aluminum can); if the purchaser eventually returns the empty container to an approved location, the fee is refunded to the consumer. This helps the environment by reducing inappropriate disposal of municipal solid waste.