

Good luck to you!

Multiple Choice

1. (5 pts.) Suppose Boulder is considering a policy where they spend \$2,000,000 this year to create a park and it generates \$1,100,000 this year and next year (they only consider this year and next). If they use an annual discount rate of 5%, what is the present value of net benefits from this policy? Is it worth it for Boulder to create the park?
 - (a) \$147,619; yes they should.
 - (b) \$147,619; no they should not.
 - (c) \$0; no they should not.
 - (d) \$0; yes they should.
 - (e) \$47,418.94; yes they should.
2. (5 pts.) Which of the following is an example of property rights being ill-defined? (You may circle more than one)
 - (a) You can not go to the store and steal the cute shirt you want.
 - (b) When the morning commute passes by your house, they release local air pollutants.
 - (c) The owner of a mine extracts Q_1^* units this year and Q_2^* units next year.
 - (d) When I listen to music in the library without headphones, everyone has to listen to Taylor Swift.
3. (5 pts.) In a cap-and-trade system, why might a government want to (i) sell permits in an auction instead of (ii) giving them out and allowing firms to buy and sell the permits between each other?
 - (a) To ensure efficient allocation of permits.
 - (b) In order to make permits cheaper for firms
 - (c) To generate tax revenue from the policy
 - (d) To discourage excessive pollution by making it expensive to obtain permits
4. (5 pts.) Which of the following is an example of the tragedy of the commons? (You may circle more than one)
 - (a) Overfishing in a shared ocean
 - (b) Planting trees in a public park
 - (c) Building a private garden in your backyard
 - (d) Painting a mural on the side of your house

Free Response Questions

5. Use 1 or 2 sentences for each question
 - (a) (4 pts.) Why is the socially optimal amount of pollution greater than zero?

- (b) (4 pts.) Why do governments find it so hard to agree on reductions in greenhouse gas emissions?
- (c) (8 pts.) Consider a very popular National Park (e.g. the Grand Canyon).
- Describe why there may be a tragedy of the commons at the park if there was no entrance fee. Why does an entrance fee help?
 - Give an argument against having the entrance fee and instead raffling off tickets.
- (d) (4 pts.) Describe the fundamental trade-off in the mineral extraction model.
6. Suppose there are two polluting firms, X and Y . Assume that permits and abatement exist in continuous quantities (i.e. they don't have to be whole numbers).
- Firm X has total abatement cost $TAC_x = 4a_x^2 + 4a_x$ and marginal abatement cost $MAC_x = 8a_x + 4$.
- Firm Y has total abatement cost $TAC_y = 2a_y^2 + 4a_y$ and marginal abatement cost $MAC_y = 4a_y + 4$.
- Both firms initially produce 50 tons of pollution (100 total), and the government wants to reduce that to 70 tons of pollution total.
- (5 pts.) Under the uniform standard, what is the total cost of abatement?
 - (10 pts.) Under a cap-and-trade system with 70 permits distributed, what is the equilibrium allocation of abatement?
 - (5 pts.) What is the total cost associated with a tradable permit system that meets this goal?
 - (10 pts.) Describe why total abatement cost is higher under the uniform standard than it is under the cap and trade system.
 - (5 pts.) What is the market price for a permit?
 - (5 pts.) Suppose the government gives out all 70 permits to firm y to compensate them for having to abate more. How many permits will they sell and how much money will that make them?
7. Consider a two-period model for the extraction of silver. Use the information below to answer the questions. If needed, you may round your answers to the tenths place (i.e. 10.6). Circle or box your final answers.
- Demand in period 1: $P = 200 - 4Q_1$
- Demand in period 2: $P = 200 - 2Q_2$
- Marginal cost in both periods: $MC = 40$
- Resource endowment: $Q = Q_1 + Q_2 = 40$
- Discount rate: $r = 10\%$
- (10 pts.) Solve for the optimal allocation across both periods (Q_1 and Q_2).
 - (10 pts.) Under the following scenarios, describe what will happen to Q_1^* and Q_2^* relative to the solution in part (a) and why.
 - After a hit show comes out where the main character wears a silver chain, demand for silver this year goes up.
 - The country elects a new president who cares more about future profits (lower discount rate).