

University of California, Santa Barbara
Bren School of Environmental Science & Management

Midterm, ESM 204

February 14, 2006

Directions (please read): Please answer all questions in your exam book, not on this sheet. This is a closed book exam. You may not use any aids except for one 8.5"x11" sheet of paper with notes (both sides). Calculators, slide rules or abacuses are ok, but NOT COMPUTERS. On the front of your exam book write the following statement and then sign the statement: "In accordance with the Bren Honor Code, I have not given nor accepted aid on this exam." Write your perm number and name on the exam book. There are four pages to this exam.

Part I (5 points per question). Answer each question True or False and provide a brief (one or two lines) reason for your answer.

1. You work for the South Coast Air Quality Management District in LA. Your boss tells you that he needs to find the most efficient way of achieving the primary air quality standard for ozone (which is a maximum concentration over the region). You decide that you need to do a cost-effectiveness analysis and not a cost-benefit analysis to address his concerns.
2. Kelman feels that although cost-benefit analysis is an appropriate way to make public decisions, sometimes it is very hard to value environmental benefits.
3. At a discount rate of 3% annually, \$100 today is equivalent to \$97 next year.
4. In the case of uncertainty regarding species survival, we are considering two plans that result in equal species protection. Plan A costs \$10,000 with 10% probability and \$100 with 90% probability. Plan B costs \$1050 for sure. If you are risk averse, and your client is too, you should prefer Plan B.
5. The value of enjoying a perfect sunset is an example of a non-use value.
6. Conducting a questionnaire in which you ask people how much they would be willing to pay to provide additional protection to the gnat catcher is an example of a revealed preference way of measure the value of environmental benefits.
7. Howard Gruenspecht argues that overly aggressive auto emissions regulations in California have resulted in more polluting vehicles being on the road.
8. The equimarginal principle requires that for a firm the marginal cost of control for all its different pollutants be the same.
9. One reasonable argument for why firms appear to be socially responsible and voluntarily reduce pollution is that they are trying to stave off mandatory regulation by appearing to be reducing pollution voluntarily.
10. Requiring firms to publicly report emissions is a nice idea but appears to have little effect on emissions levels.

Part II (25 points per question). Answer both questions. Show your work.

1. The Woozle is native of Humboldt County in the wilds of Northern California and is endangered. It prefers coastal areas but is reasonably happy in inland redwood forests too. In fact, a bit of both is not bad habitat. You work for the nature conservancy and are charged with trying to save the Woozle. You consult Woozle-biologists who provide you with the following table of survival probabilities as a function of the amount of land you set aside as habitat for the Woozle:

Inland Acres Acquired	Coastal Acres Acquired	Woozle Survival Probability
10	10	0.05
10	20	0.10
10	30	0.15
10	40	0.20
20	10	0.10
20	20	0.20
20	30	0.30
20	40	0.40
30	10	0.15
30	20	0.30
30	30	0.45
30	40	0.60
40	10	0.20
40	20	0.40
40	30	0.60
40	40	0.80

Make a graph showing acres of coastal land acquired on the horizontal axis and acres of inland land acquired on the other axis. Plot several lines of constant probability of survival for the Woozle. You are now given a budget of \$2,200,000 to protect the Woozle. You know land costs \$100,000 per acre on the coast and \$10,000 per acre inland. Show on your graph possible combinations of coastal and inland lands you can afford, using up your budget. Estimate how much land of each type you should buy and the corresponding survival probability of the Woozle.

2. You are charged with figuring out the demand curve for visits to Kings Canyon National Park. You decide to sit outside the entrance gate on a typical two-week period and determine where people began their journey. Your results:

Origin	Number of visitors
Arcata	1
Bakersfield	97
Los Angeles	2538
Sacramento	125
San Jose	170

You go to MapQuest and find the following travel characteristics from these locales:

Origin	One-way distance (mi)	One-way travel time (hr)
Arcata	530	8.9
Bakersfield	71	1.7
Los Angeles	180	3.4
Sacramento	266	4.6
San Jose	206	3.8

You go to the Census website and find the following population numbers and average hourly income for these cities:

Origin	Population	Average Hourly income (\$)
Arcata	20,000	20
Bakersfield	250,000	30
Los Angeles	10,000,000	40
Sacramento	450,000	15
San Jose	900,000	50

- What do you estimate the total visitors are from each city over the entire year?
- What is the annual visitation rate from each city?
- Ignoring time spent at the park, what is the estimated travel cost (round trip) from each locale, including the \$20 entrance fee? Assume out of pocket expenses for a car amount to \$0.50 per mile.
- Putting the visitation rate on the horizontal axis and travel cost on the vertical axis, plot your data. Draw a best fit line through this data and write down the equation for visitation rate as a function of travel cost.
- If the park entrance fee went up by \$20, calculate the new visitation rate for each town, and the total number of visitors from each town. How many fewer visitors are there from the increased fee?