

BA3320 Fundamentals of Production

EXAM 1 Winter 2007

Dr. Banis

NAME:

Section time:

total 300

I

A team of managers is considering whether to expand the city's airport. The value of doing so depends on the future economic environment in the area including the decisions made by airlines about using the city as a major hub or stop. Studies have indicated the probabilities for three different scenarios as indicated in the payoff table.

The table also indicates projected NPV in \$M for each level of expansion for each state of the economic environment.

Calculate EMV for each option and show which alternative would be selected if following a maxEMV strategy.

Payoff (\$M, NPV) numbers in parentheses are losses

20

	Economic Environment		
	poor	good	great
Probability	0.5	0.4	0.1
do nothing	40	20	25
expand	22	35	35
double capacity	(20)	40	50
calc EMVc			

EMV

10

What is the most you would pay for perfect advance information on which economic state will prevail this time?

Show regrets for each case, and what the choice would be for a minimax regret strategy.

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regrets(\$M, NPV)

	Economic Environment		
	poor	good	great
do nothing			
expand			
double capacity			

worst regret for each strategy

10

How much lower would the expected profit be if you follow Minimax Regret rather than Max EMV?

Total = 60

II 1) You are selling ethanol powered sewing machines that have normally distributed lifetimes (before needing major service) with a mean of 10 years and standard deviation of 4 years. How long should you make the warranty so that there will be less than 20% chance of breakdown within the warranty period? (show work and put answer in the box)

warranty length

2) Suppose, for those sewing machines, instead of a warranty, you are selling a six-year service contract. If the average cost of a repair that would be covered by this contract is \$200, about how much should you charge for the whole six-year service contract to break even? Assume there is no other coverage for service, such as a warranty.

1. \$200
2. \$100
3. \$31.74
4. \$138
5. The printers won't break down until they are more than 10 years old

3) Sales of ice cream and hot latte are weather dependent. Ice cream profit is only \$10K in cold weather, but \$40K in hot. Hot latte sells better in cold weather. Profit is \$50K in cold weather, \$30K in hot. At what probability of hot weather would you be indifferent between these two businesses?

1. Phot= 20%
2. Phot= 30%
3. Phot = 50%
4. Phot= 80%
5. Phot= 150%
6. 100% of each
7. Phot=50/ 80
8. Phot= 60/70
9. Phot= 10/45
10. Phot= 30/60

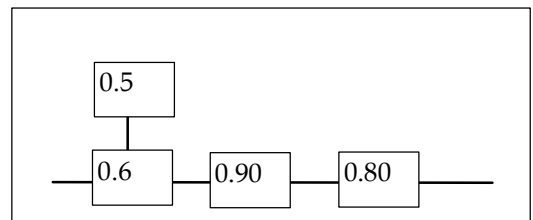
15
each

4) You are filling 32 oz.beer bottles using a process with a standard deviation of 5 ounces. If you want your X-bar chart to have 3 sigma limits on either side of the mean and to have LCL, UCL at 29 and 35 oz. respectively, how large a sample should you use for each data point?

1. one
2. two
3. four
4. twelve
5. twenty-five
6. sixteen
7. one hundred
- 8.

5) If the cost of a failure is \$1000, what is the approximate value of the backup piece labeled r=0.5?

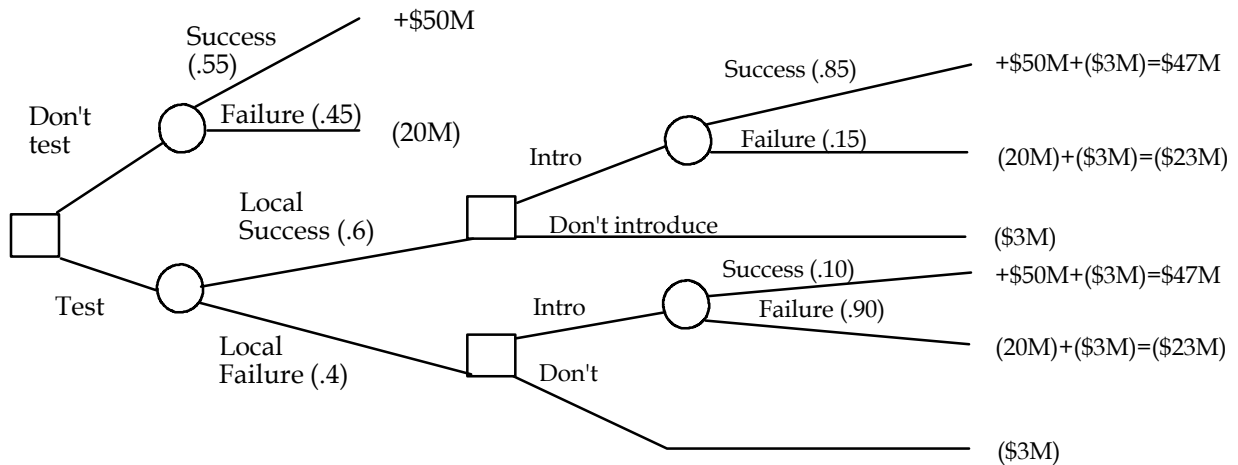
1. \$144
2. \$576
3. \$432
4. \$500
5. \$1000
6. less than \$100



Total = 75

3) You are trying to decide whether you should market test new cosmetics kits.
 III If you introduce each without testing first, the 55% that succeed will give profits of \$50 million each, the other 45% will fail dismally and give losses of \$20 Million.
 The market test costs \$3 Million for each product tested, but allows you to distinguish between products with high probability of success and those that are more likely to fail.
 The probabilities and payoffs (losses) are shown in the tree.

This case gives the following decision tree with the Net Present values for each alternative at the terminal nodes:
 Values in parentheses are losses.



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a) Calculate expected profit for each node in the tree. note that numbers in parentheses are negative profits, or losses. Is it better to test or not? explain

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b) What's the value of the imperfect information given by the test? show calculations.

Total = 60

IV Two scientific research laboratories are working on parallel programs in separate buildings at Hoosier U.. The research is fairly significant and could result in Nobel Prizes for breakthroughs. Future grants depend on how much credit each could claim for scientific findings. The laboratories have complementary expertise and could collaborate on the programs for more rapid progress. If both are secretive, progress will be slow.

The professors who run these labs, A.Rogant, and B. Zarre, however, don't get along well, and tend to distrust each other. Each is afraid the other would be secretive over any real breakthroughs until they could claim sole credit for the success. The three strategies that could be pursued are shown in the table, with A. Rogant's controlling which row in each column, and B. Zarre's controlling which column in each row. This results in the following payoff matrix, with A's payoffs in the upper left corners and B's in the Lower right.

Future grants in \$K as a function of collaboration strategies

A.Rogant/ B.Zarre	B secretive	B share some	B collaborate	B.Zarre's Maximum Grants
A Secretive	50 / / 50	250 / / 40	1300 / / 30	
A Share some	40 / / 250	240 / / 240	1250 / / 50	
A Collaborative	30 / / 1300	50 / / 1250	1200 / / 1200	
A.Rogant's Maximum Grants				

- 30 A) Assuming that A and B work independently to maximize their own future grants, show what A's response would be to each strategy of B and vice-versa. Use squares for A and circles for B. Is this a
- 10 B) Draw lines through rows and columns that represent dominated strategies that wouldn't be pursued by each competitor regardless of the other's strategy.
- 5 C) With each following the prisoner's dilemma competitive strategy, what is the stable result? WHY is this result stable?
- 5 D) What would the best combination of strategies be for A. Rogant and B. Zarre to maximize Progress & total grants to the University? (What cell has the highest total?) What would each get?
- 5 E) What could be done to enforce an agreement between the two to pursue the best result rather than the prisoner's dilemma result?
- 5 F) Is this a zero-sum game? Why or why not?

Total = 60

V

1) There are two ways to produce color covers for books we are printing and binding in house. **Ignore any corrections for the time value of money**

1. Pay to have them printed outside. Fixed setup cost is \$1000 per year and each cover costs 50 cents.
2. Buy a new color printer and print in house at a cost of 25 cents each (including paper, toner, electricity, etc.). Purchase of the color printer, fixed maintenance etc, would run \$3000 per year

A) How many copies would I have to make per year to break-even on buying the color printer?

15

Breakeven copies/year

B) Assuming we need about 5,000 covers per year, how much could we spend per year on a printer and still break even compared to printing outside?

Breakeven copier price

15

2) The practice of working overtime while slacking off during regular working hours:

1. the minimax regret strategy.
2. the overflowing bologna sandwich technique.
3. the salami technique.
4. decision trees.
5. factor rating.
6. Ben Franklin's balance sheet approach.

5

3) A good place to start on a complex decision with many subjective variables when you don't know what else to do and where to begin:

1. Product failure half-life
2. Prisoner's Dilemma Model
3. Calculated Breakeven
4. Ben Franklin Balance Sheet
5. Sensitivity Analysis
6. The Salami Technique in negotiation
7. Tit-for-tat strategy
8. Situational Optimism
9. The Golden Rule in TQM

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4) When should you get more information?

1. When the information is relevant and could change the outcome.
2. When you don't have anything better to do on nights and weekends.
3. Whenever your boss hasn't told you what else to do before quitting time.
4. When there's any more information to get.
5. When the information is worth more than it costs.
6. It depends on the Radar O'Reilly phenomenon.

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Total =45