

BA3320 Operations Management

EXAM 1 Summer 1 2007

total 300 points

Dr. Banis

NAME:

I A team of managers is considering whether to expand the city's shopping mall. The value of doing so depends on the future economic environment in the area including the decisions made by major department stores to set up shop in their city's mall.

I 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

circle best

EMV

	Economic Environment		
	poor	good	great
Probability	0.5	0.4	0.1
do nothing	20	25	20
expand	4	10	50
double capacity	2	9	70
calc EMVc			

20

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

10

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

regrets (\$M, NPV)

worst regret for each strategy

	Economic Environment		
	poor	good	great
do nothing			
expand			
double capacity			

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

10

Total = 60

II

**Pick the
one best
answer
for each
question**

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6) You want to replace your refrigerator at an age that gives less than 20% probability of a breakdown. Lifetimes of refrigerators are normally distributed with a mean of 13 years and standard deviation of 2 years. At what age should you retire the refrigerator?

- A. 13 years
- B. 15.5 years
- C. 13.44 years
- D. 2.6 years
- E. 14.7 years
- F. 1.68 years
- G. 10.6 years
- H. 11.3 years
- I. 20.2 years

15

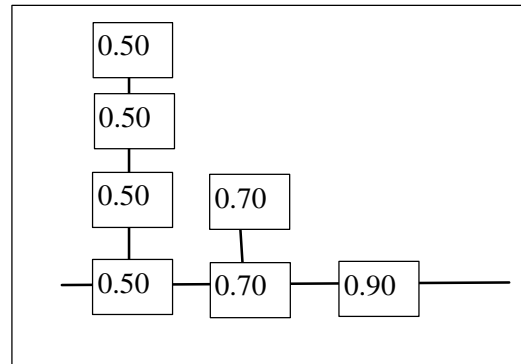
7) Your company can either upgrade its old computers or buy new ones. If you upgrade the old ones the investment corresponds to a fixed cost of \$5K/yr. Buying new corresponds to a fixed cost of \$20K per year. Upgrades would give a cost of \$100 per job processed. New computers are better and would reduce the variable cost to \$50 per job. How many jobs would you have to process a year to make you indifferent between the two options?

- A. 40
- B. 50
- C. 166.67
- D. 200
- E. 300
- F. 400
- G. -400

20

8) What is the reliability of this system?

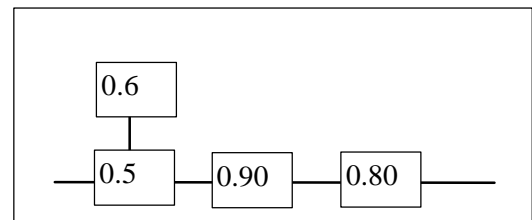
- A. 2.79
- B. 4.32
- C. virtually 100%
- D. 5.985
- E. 1.26
- F. 0.837
- G. 0.7678125
- H. 0.744
- I. 0.6825
- J. 0.36
- K. 0.0288



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9)) If the cost of a failure is \$1000, what is the approximate value of the backup piece labeled $r=0.6$?

- A. \$144
- B. \$216
- C. \$360
- D. \$432
- E. \$500
- F. \$576
- G. \$1000
- H. less than \$100



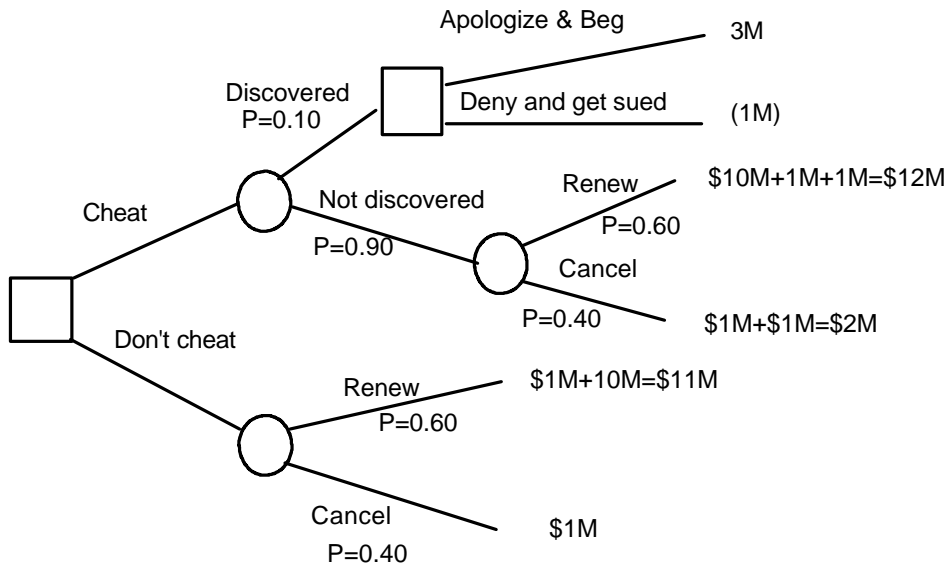
Total = 70

III

Expected value of Future Business and incentives to cheat

In the spirit of Supply Chain management, ABCo. has a partnership arrangement with one of its vendors, DEFCo and has decided to eliminate 100% inspections of incoming materials. As a result, the vendor could overcharge for poor quality material and there would only be a 10% chance that ABCo would discover it. Suppose the two plan to do enough business this year that the vendor would net \$1M. If the vendor cheats without getting caught, he could make an additional \$1M. If ABCo discovered the cheating, and the vendor tries to deny it, ABCo would sue and DEFCo would lose the \$1M gained through cheating, the normal \$1M profit, would suffer court costs of \$1M and would be eliminated from future business with ABCo. The present value of future business is \$10M. The folks at ABCo want to be nice guys and turn the other cheek, so if after being caught, DEFCo chooses to admit, beg, and cajole, they would lose the \$2M of ill-gotten gains, but would still enjoy future business with ABCo with a present value of \$3M. If ABCo is unaware of any overcharges, the probability of a contract renewal is 60%.

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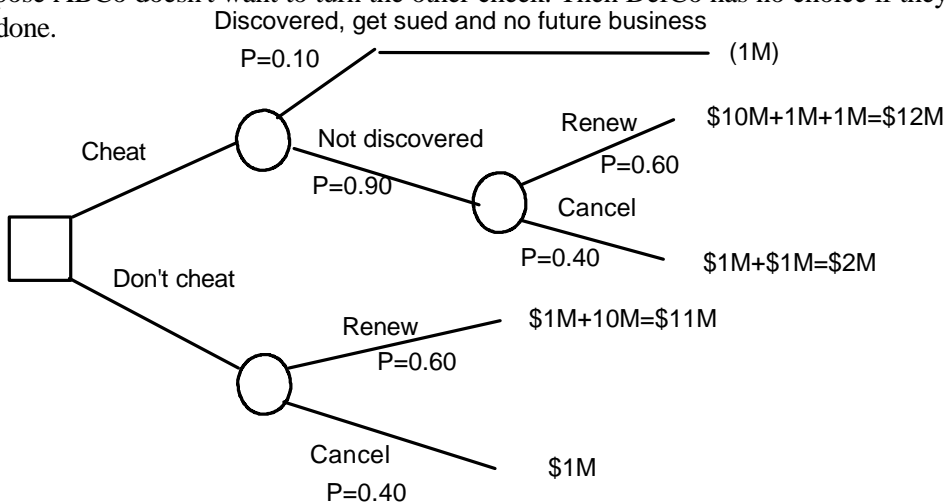


Please write values for the nodes or you may not get credit. These are profits except for values in parentheses, which are negative profits, or costs

A) Calculate values at the intermediate nodes (branch points). If the DEFCo's only objective is to maximize EMV as shown in this diagram, show which alternative DefCo should choose.

B) Suppose ABCo doesn't want to turn the other cheek. Then DefCo has no choice if they get discovered, they're done.

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Under these new circumstances, does DEFCo still have incentives to cheat?

10

C) What are three other things that could be changed to reduce the incentive to cheat?

- 1.
- 2.
- 3.

IV Highway Merge Lanes During Rush Hour--A Prisoner's Dilemma Model

This is a drastic oversimplification, but let us pretend we can project the results of interacting strategies by representing populations on the highway as two people in a prisoner's dilemma game. There is a merge lane at the junction of highways 40 and 270 where people can either take turns and merge smoothly, or else pass everyone in the right hand lane (which ends) and cut into the front at the last minute. Of course, if people pursue this "me first" approach, all the cars approaching the forced merge have to slam on their brakes, and as a result, the highway is jammed up with stop-and-go traffic for miles. Once someone starts the aggressive game, anyone who is courteous ends up being constantly cut off and pushed back. The paradox is that if traffic merged smoothly, this part of the highway could be traversed at a steady speed of about 40 mph by everyone. In the discourteous mode, everyone suffers. Here is a table that might represent speeds achieved by each type of player for different combinations of strategies when players differ in their aggressive driving skills. Joe controls which row. His speeds are the upper left. Sally controls which column within each row. Her speeds are in the lower right.

<i>Joe's and Sally's speed at the merge of highways 40 and 270</i>				
Joe / Sally	courteous	aggressive weaving	duels and cutting off	Sally's best speed
courteous	40 / 40	20 / 50	2 / 60	
aggressive weaving	55 / 20	35 / 25	5 / 40	
duels and cutting off	50 / 2	30 / 5	10 / 10	
Joe's best speed				

30 Please note that each party wants to MAXIMIZE the speed of getting through this section of highway. Use squares for Joe and circles for Sally to show which strategies would prevail if each party only chose to maximize their speeds in each situation. What is the stable solution from this inconsiderate behavior? Answers must be consistent. (Big hint to keep you from doing it exactly wrong: The answer is NOT that they would both be courteous!) circle one for each to show what the prisoner's dilemma combination would be.

10 Joe would: be courteous aggressively weave duel and cut off other people
 Sally would: be courteous aggressively weave duel and cut off other people

20 Show, which strategie(s) are dominated and wouldn't be pursued in any case in the prisoner's dilemma model by drawing lines through the dominated rows and columns.

10 What would be a better solution for them both? What are three things that could be done to enforce a stable agreement on that better solution?

- 1.
- 2.
- 3.

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1) *Stadium sales of beer and hot drinks are weather dependent. Beer profit is only \$5K in cold weather, but \$45K in warm. Hot drinks sell better in cold weather. Profit is \$25K in cold weather, \$15K in warm. At what probability of warm weather would you be indifferent between these two businesses?*

- A. $P_{\text{warm}} = 50\%$
- B. $P_{\text{warm}} = 150\%$
- C. $P_{\text{warm}} = -30\%$
- D. $P_{\text{warm}} = 30\%$
- E. $P_{\text{warm}} = 40\%$
- F. $P_{\text{warm}} = -40\%$
- G. 100% of each
- H. $P_{\text{warm}} = 25/35$
- I. $P_{\text{warm}} = 35/25$

5

2) *A key factor, often maligned, leading toward higher productivity is*

- A. trusting people who are smarter to make the right decisions.
- B. getting more people.
- C. getting fewer people to put in longer hours to get the work done.
- D. diligence--willingness to work harder.
- E. thorough and persistent cost-cutting strategies.
- F. rational laziness.
- G. the ability to keep working on something even if it's wrong.
- H. none of the above.
- I. all of the above, especially H.

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3) *The best way to get people to make decisions in pursuit of company goals is to*

- A. get rid of people who make mistakes.
- B. identify responsibility for each decision and punish or reward people for results in each case.
- C. promote the winners, demote the losers.
- D. depersonalize decisions by agreeing on a process and applying it with reasonable consistency.
- E. supervise people more closely so they don't make selfish decisions.
- F. do everything by committee.
- G. get as much data as you possibly can before ever making any decisions.

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4) *When should you get more information?*

- A. It depends on the Radar O'Reilly Phenomenon.
- B. Whenever the information is relevant and could change the outcome.
- C. When you don't have anything better to do on nights and weekends.
- D. Whenever your boss hasn't told you what else to do before quitting time.
- E. When there's any more information to get.
- F. When the information is worth more than it costs.
- G. Whenever anybody asks for it.
- H. Perfect information is always worth getting. Not so if the information is less than perfect.

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

- A. the minimax regret strategy.
- B. the overflowing bologna sandwich technique.
- C. the salami technique.
- D. decision trees.
- E. factor rating.
- F. Ben Franklin's balance sheet approach.