

BA3320 Operations Management

EXAM 1 Fall, 2007 total 300 points Dr. Banis

Closed book, One page of notes. No team efforts.

NAME:

I

You are concerned about Year 2000 problems with your existing collection of computers of various vintages. You could decide to not worry about it, to hire a consultant to check everything out, or to buy all new equipment that is guaranteed, so it isn't an issue.

There are three possibilities you won't know about until January 1, 2000.

From your reading, you can estimate probabilities for the three situations.

- A. your old equipment has a small problem
- B. Your equipment has a big problem, but the consultant could fix it.
- C. Your equipment has a big problem, and the consultant is a jerk so the consultant wouldn't fix it right.

Here are costs associated with the 3 strategies and 3 unknown situations:

Calculate EMV's for each strategy and indicate the one that is preferred by circling it.

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The Y2K Problem

	Total costs (\$K)			EMV (circle selection)
	small problem	big problem, but good consultant	big problem and bad consultant	
Probability	0.4	0.55	0.05	
don't worry, no consultant	500	3,500	3,500	
hire consultant for 500K	500	500	4,200	
Buy new, guaranteed, no consultant	2,000	2,000	2,000	
EMV certain				

Suppose the employee making the decision works on a minimax regret (CYA) strategy. show regrets in each case and indicate which strategy the employee would recommend

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The Y2K Problem--Regrets

	Total costs (\$K)			Minimax Regret (circle selection)
	no problem	problem, but good consultant	problem and bad consultant	
don't worry, no consultant				
hire consultant for 500K				
Buy new, guaranteed, no consultant				

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What is the expected cost difference for having an employee use CYA rather than EMV?

put answer here

put answer here

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Suppose with a little reading and preliminary tests you could figure out with certainty whether you really have a problem and whether the consultant is good. compared to following an EMV strategy, what would this perfect information be worth?

Total = 60

II

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

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1) www.joesinternetsales.com has customers mail checks before shipping merchandise. The average sale is \$20, with a profit of \$5.60 and Joe is now selling about 100 items per month. processing checks costs 20 cents per transaction.

More people would buy if he had a merchant account and could accept credit cards. A credit card merchant account involves fixed costs of \$60 per month for software, reports, etc., plus 60 cents per average transaction (20 cents per transaction plus 2%)

Assume Joe would continue to have 100 cash transactions per month. How many additional sales would he have to get from credit card customers to make the merchant account worthwhile?

- A. 3
- B. 6
- C. 10
- D. 12
- E. 20
- F. 50
- G. 100
- H. it wouldn't help

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2) Lifetimes of wooden pillars are normally distributed with a mean of 23 years and standard deviation of 4 years. If you wait to replace the pillars that hold up your front porch until they are 19 years old, what is the probability of the porch falling down? Show calculations but put the final answer in the box.

Pfalldown

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3) Your process makes porch pillars with a diameter of 200 cm. and a standard deviation of 2 cm. sample size is n=9. If you use 3 sigma limits on each side of the target mean, what is your upper control limit? Show calculations but put the final answer in the box.

UCL

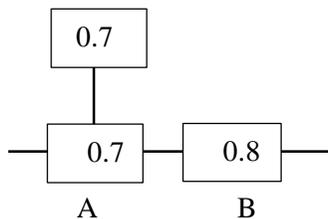
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4) To detect increases in variability of the porch pillar diameters (as opposed to shifts in the average result), it would be best to use:

- A. an X-bar chart
- B. a p-chart
- C. a V-chart
- D. an R-chart
- E. a c-chart

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5) In the following system, if the cost of a failure is \$2000, what is the most you would pay (break even) for the backup of component A, as shown? (Hint: the value of the backup is the difference in expected cost of failure for having the backup part vs. not having it.)



- A. \$1,120
- B. \$880
- C. \$544
- D. \$336
- E. \$16.956
- F. \$4,600
- G. \$16,247,356.98

Total = 80

III

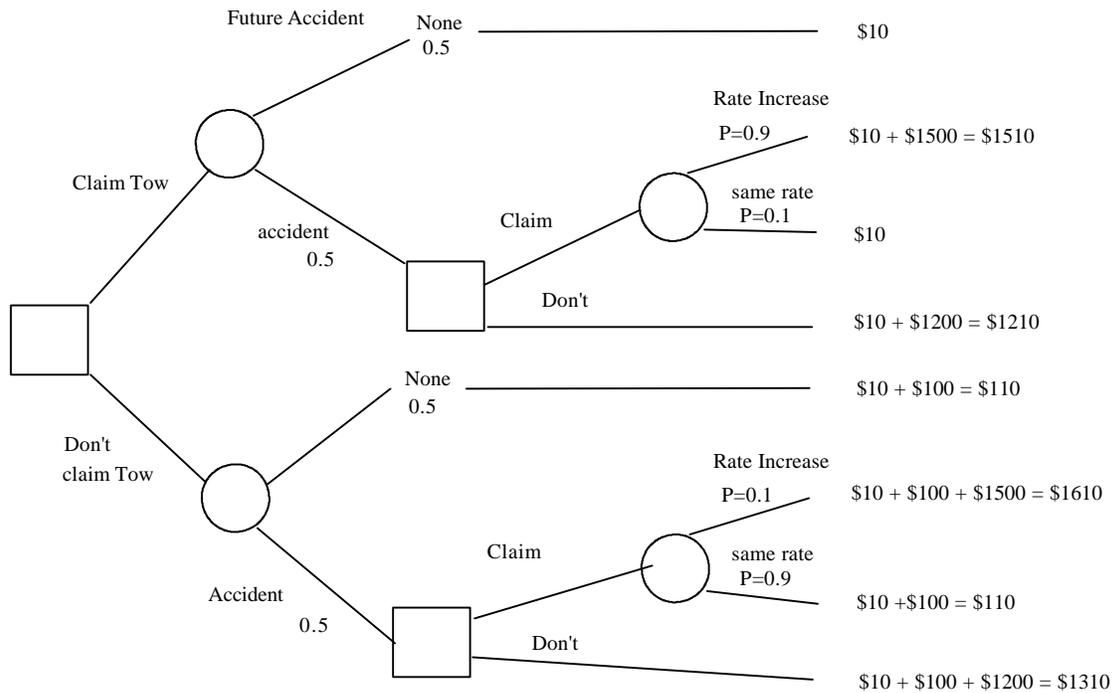


My GRANDMOTHER is watching you.

3) Should you make an insurance claim even though it may raise your rates?

You canceled your auto club membership that costs \$50 and added emergency towing insurance on your automobile insurance policy for \$10. You had a breakdown with a \$100 towing fee and are having second thoughts about submitting the claim. Your "claim-free" rate on your insurance policy would be unaffected by this one claim, but if you had an accident in the next year, your rates could go up enough to cost you an extra \$1500 (present value). Of course, you could always claim this expense and choose not to claim a future accident if it happens. There are two possible future states (adjusted to present values): no accident ($P=.5$), or a \$1200 accident ($P=.5$). For simplicity, assume that all this applies to only the next year, so any accidents beyond this planning horizon would be irrelevant. The decision tree below shows 1) the decision to claim the tow or not; 2) probabilities of a future accident; 3) the decision whether or not to claim damages for the second accident. I've calculated costs for each terminal node to include the cost of towing insurance, damages not claimed for each incident and increases in insurance rates in branches where both an accident and the tow are claimed.

I've incorporated all this into the diagram. You should be able to work with the tree directly without having to reinterpret the text explanation.



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A) Evaluate the tree, showing values at each branch node. Note these are **COSTS** and so you want to pick the **LOWEST**. Should you put in the report for the tow and ask for compensation ? why or why not?

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B) The towing rider on your insurance policy costs \$10 per year. An auto club membership costs \$50. Consider only the costs, benefits and risks described. Assume that everything relates to a one-year planning period. Assume a \$100 tow per year is essentially certain. Would you be better off in the future paying \$40 more for the auto club towing coverage? Why? Compare your situation on the towing claim with the auto club vs. bundling it with other auto insurance.

Total = 55

IV HiQ Manufacturing Company buys manufacturing supplies from the Jones Company. For many years HiQ was run by its founder, A kindly old gentleman who believed all that schmaltzy stuff about TQM and Deming's 14 Points. Now his son has taken over, and his son considers himself a little more "street smart" than the old man.

The son has been exposed to game theory and things you'd better watch out for what people might do unto you.

He knows that some suppliers will take advantage of "nice guys" and cut corners on quality to boost their own short term profits. Quality of the final product is affected by quality of the parts, and higher quality work gives more total profit.

There are three strategies the HiQ can pursue:

- A. Overpay the supplier and hope they will perform exceptionally;
- B. Pay the standard rate, expecting them to live up to the agreement;
- C. Underpay ("strike a hard bargain") to allow for the fact that they will probably have to fix things.

Likewise, Jones can adopt one of three strategies:

- A. Do excellent, thorough work;
- B. Meet the minimum specifications;
- C. Cheat on quality and cut corners to increase short term profits.

HiQ controls which row will be picked. Jones controls which column.

Use squares for HiQ and circles for Jones to show which strategies would prevail if each party only chose

Short term Profits in \$M as a function of Pay and quality performance				
HiQ / / Jones	lowQ/ shoddy	Minimum	Thorough/ excellent	Jones' Maximum Profit
underpay,hardball	10 / / 25	45 / / 22	85 / / 20	
Pay average rate	5 / / 30	50 / / 27	90 / / 25	
overpay/reward	0 / / 33	43 / / 35	80 / / 30	
HiQ's Maximum profit				

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to maximize short term gain. How much would each make in the stable solution?

(please note if you end up with a stable solution of rewards and excellence, you've done it backwards--life doesn't work that way.)

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Show, by drawing lines through those rows and columns, which strategies are dominated and wouldn't be pursued in any case.

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What would be a better solution for them both? If they think about it, do they have incentives to maintain that better solution?

V 1) *An often-overlooked key factor leading toward higher productivity is*

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

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

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

4) *I'm considering two machines for quilting. The \$1500 Elna machine is less automated than the Bernina \$3000 machine. Stippling a quilt will cost me about \$150 per quilt with the Elna, but only about \$50 per quilt with the Bernina. I might get bored and quit quilting before making 1000 quilts, but wonder how many I have to make in order for the difference in cost to be justified. How many quilts would I have to make to recover the additional investment and make the Bernina worthwhile?*

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Breakeven number of quilts

3) Sales of umbrellas and mascara are weather dependent. Umbrella profit is only \$10K in dry weather, but \$40K in rain. Mascara sells better in dry weather. Profit is \$20K in dry weather, \$5K in rain. At what probability of rain would you be indifferent between these two businesses?

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- A. Prain = 50%
- B. Prain= 150%
- C. Prain= 20%
- D. Prain= 30%
- E. 100% of each
- F. Prain= 25/ 35
- G. Prain= 35/25
- H. Prain= 10/45
- I. Prain= 30/60
- J. Prain= - 30%

Total = 50

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