

BA 252 Production Management

total 350

EXAM 1 summer 2000

Dr. Banis

NAME:

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Closed book, One page of notes. Pick the one best answer on multiple choice questions. Calculations and comments on multiple choice questions will be ignored

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1) An example of intransitive preferences in deciding among alternatives is demonstrated by

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

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2) When should you get more information?

- A. When the information is relevant and could change the outcome.
- B. When you don't have anything better to do on nights and weekends.
- C. Whenever your boss hasn't told you what else to do before quitting time.
- D. When there's any more information to get.
- E. When the information is worth more than it costs.
- F. It depends on the Radar O'Reilly phenomenon.

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3) Compared to the northwest corner method, the intuitive approach

- A. uses less information.
- B. avoids degeneracy.
- C. avoids unequal supply and demand.
- D. leaves fewer cells which need to be evaluated.
- E. gives the same result as the VAM
- F. takes cost into account.

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4) In transportation model analysis the stepping-stone method is used to:

- A. obtain an initial optimum solution.
- B. obtain an initial feasible solution.
- C. evaluate occupied cells for potential cost reductions.
- D. evaluate empty cells for possible degeneracy.
- E. evaluate empty cells for potential cost reductions.
- F. balance supply and demand.

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5) In a transportation model analysis where supply is less than demand it is necessary to use:

- A. the stepping-stone method.
- B. a dummy destination for demand.
- C. the modified distribution method (MODI)
- D. A different method, because the table is degenerate
- E. A dummy source of supply.
- F. VAM because the intuitive method won't work

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6) Stadium sales of Anchovy ice-cream are weather dependent. Profit is only \$10K in cold weather, but \$50K in warm. An alternative is to chocolate-coat them. Chocolate covered anchovies sell better in cold weather. Profit is \$20K in cold weather, \$10K 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. $P_{\text{warm}} = 20\%$
- D. $P_{\text{warm}} = 30\%$
- E. 100% of each
- F. $P_{\text{warm}} = 25/35$
- G. $P_{\text{warm}} = 35/25$
- H. $P_{\text{warm}} = 10/45$

Total = 70

II I. Pwarm = 30/60

1) I'm considering buying a machine to automate binding of books. The current process has fixed costs of \$1000 per year and variable costs of \$2 per book. The new equipment would raise fixed costs to \$2500 per year, but would reduce variable cost to \$1 per book. At what manufacturing volume (books/yr) would I be indifferent between the two options? put the answer in the box.

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book/yr.

20

2) You want to replace the pillars that hold up your front porch at an age that gives less than 20% probability of the porch falling down. Lifetimes of wooden pillars are normally distributed with a mean of 24 years and standard deviation of 4 years. At what age (within a year) should you replace the pillars?

- A. 4.8 years
- B. 16 years
- C. 18.2 years
- D. 20.6 years
- E. 38.4 years
- F. 24 years

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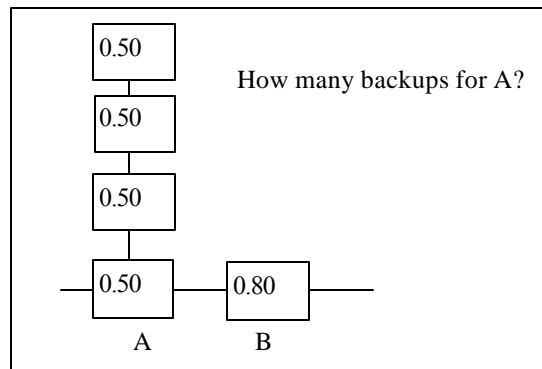
3) Your process makes porch pillars with a diameter of 200 cm. and a standard deviation of 2 cm. How large a sample do you need so that the standard error of the mean of that sample is 0.5 cm.?

- A. 2
- B. 4
- C. 8
- D. 16
- E. 100

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4) Cost of a failure is \$4000. Cost of a backup for component A is \$500. The figure shows four, but, to minimize total expected cost, how many backups should you have on hand for component A? (It could be more or fewer than four)

- A. none
- B. one
- C. two
- D. three
- E. four
- F. five
- G. six
- H. eight



III *Salting the Roads at Humongo Corp.*

Humongo Corp salts its private roads and parking lots. The employees who drive around in rusted out old Pontiacs wonder why the facilities people use so much salt despite the relatively minor climate. The Consulting Yahoo Agency (CYA) does management training at Humongo. A committee of middle-managers at Humongo is paid big bucks to help the Safety and Operations Council (SOC) make an informed decision to do one of three things:

- A. Use no salt, or very little
- B. To use moderate amounts and live with an occasional undersalting.
- C. To dump phenomenal amounts of salt every time the weather gets cold, just in case (JIC)

The result of these policies depends on what actually happens with the weather and with the litigious proclivities of the populace who might slide on the ice. Dumping heebiegobs of halides also results in the need to replace shrubs and company vehicles frequently due to the corrosion.

This gives the costs shown in the table.

If costs are "too high", SOC members worry they could get fired for giving bad advice(SOC would be

Total cost of as a function of severity of storm and litigiousness of the populace

		combined cost of salt and suits (\$K)			
weather & attitudes		mild	icy	bitter	EMLoss
Probability		0.75	0.20	0.05	
little salt		10	20	2,000	
bunches of salt		100	100	1,000	
Heebiegobs of halides		1,000	1,000	1,000	

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Potential Regrets as a function of severity of storm and litigiousness of the populace

		Regrets		
weather & attitudes		mild	icy	bitter
little salt				
bunches of salt				
Heebiegobs of halides				

sacked). Show what they would recommend if they were taking a minimax regret strategy. Circle the lowest worst regret.

Total = 40

IV *Negotiating a labor contract - a zero-sum game for wage per hour:*

A variety of interesting negotiating techniques are used in the process of arriving at union wage contracts. The result is a split of the potential raise between the company and the union workers. Assume the opponents commit to their strategies ahead of time, and combinations of strategies give the wage increases shown in the table:

A) The union would like the largest raise it can get. For each strategy of B (the company) show which strategy A (the Union) would prefer, and vice versa. Use squares for A's choices and Circles for B's strategies. Write the results in the last row and last column.

30

Union Gain/Company Cost (cents per hour)

Company (B) -->	Wimp	Cooperative	Belligerent	Company's best - lowest cost
Union Gain (A)				
wimp	20	0	10	
cooperative	40	30	25	
Belligerent	100	50	40	
Union's best - Highest raise				

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B) Which combination of strategies would result in a stable saddle point solution? (must be consistent)

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C) What are the dominated strategies that wouldn't be pursued in any event? put lines through the dominated rows and columns and write the dominated strategies below. (must be consistent)

Union (A)

Company (B)

Total = 50

My **Grandmother** is watching you.
Do not Cheat!



V

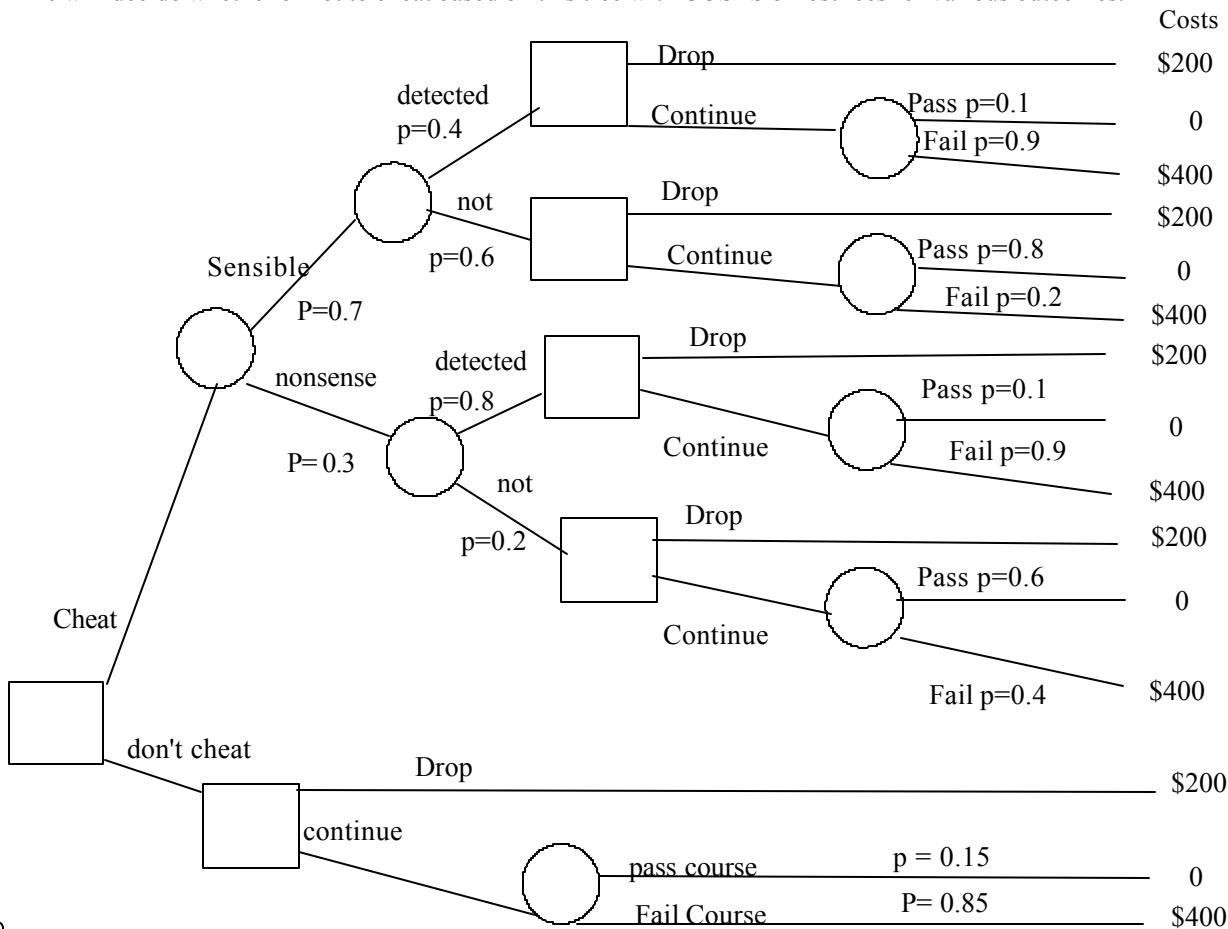
The person sitting next to you (with the baseball cap over his eyes) missed a few classes and has no idea in the world how to do most of this exam. He assumes that you know more than he does and may copy the stuff you have on your paper even if it doesn't seem to make any sense.

The risk is that your stuff may really **not** make any sense, and there is also the risk of being caught by the alert, eagle-eyed professor. However, with current University policy, the most degrading outcome allowed would be an F in the exam, so if he gets caught cheating, then he will flunk the exam, but still has a 10% chance of passing the course. He could also drop the course discreetly and tell his parents that the instructor was an incorrigible pompous buffoon. If he drops soon, he can get half his money back.

Suppose the probability that you know what you are doing is 70%, and The probability of him being caught is only 40% if the answers are correct. The probability is higher if you don't know what you are doing and both papers have the same exact nonsense written on them.

If he cheats without detection and copies anything sensible from your paper, then he would increase his chances of passing the course from 20% to 80%. Copying anything would improve his probability of passing the course. If he passes the course, he avoids paying to try again next semester. The tree captures all this.

He will decide whether or not to cheat based on this tree with COSTS of lost fees for various outcomes.



70

a) Calculate expected costs for each alternative. Show decisions and expected monetary values at branch points. Put the numbers in the boxes and circles. If he only cares about expected costs, would he cheat or not?

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b) What are two things that could be changed in this model to reduce the incentive to cheat on exams?

1)

2)

total = 80

Values are Rounded and may not add up

VI Linear Programming (cafe lite and cafe burnt)

Mills Brothers Coffee Company makes 4 blends of coffee: Premium (P), Commercial(C), Watery (W) and Robusto (R). They take different amounts of labor, beans, cereal, grinding machine time and roasting machine time per can as shown in the table. Profits per can are also shown on the table

	P	C	W	R	RHS=	Availabl e
Unit Profit-->	5	2	2.5	7		
constraint						
labor min.	2	1.5	2	5	<=	8,000
Beans lb.	2	1.5	0.5	2.5	<=	5,000
Cereal lb	0.5	0.5	1.5	0	<=	12,000
Grind min.	2	1.5	1.5	3	<=	6,000

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1) What is the optimal production plan and what would the profit be for that plan?

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2) Suppose someone offered to buy your grinding time for \$2/min. How many minutes are you sure you should sell?

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3) how many pounds of beans are you sure you should sell if the price were \$5/lb.?

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4) If everything else remained the same, how low could the profit on commercial grind go before you would change to a different solution?

Variable	Value	Current Coefficient	Lower Limit	Upper Limit
Premium	1,286	5	3.4	5.11
Commercial	0	2	-infinity	3.75
Watery	571	2.5	1.7	2.75
Robusto	857	7	6.88	8.33
Objective Function Value =13857 (rounded)				

Constraint	RHS	Slack	Shadow Price	Lower Limit	Upper Limit
labor min.	8,000	0	0.07	6,500	10,000
Beans lb.	5,000	0	1.29	2,000	5,500
Cereal lb	12,000	10,500	0	1,500	+infinity
Grind min.	6,000	0	1.14	5,600	7,000
Roast min.	10,000	2,286	0	7,714	+infinity

total = 35