IDS 291 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exam III Section \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sample A ` Dr. Scott Stevens

CHANGE YOUR VIEW TO DRAFT WHEN VIEWING THIS SAMPLE EXAM. BY MOUSING OVER AN ANSWER, YOU’LL SEE A POPUP ABOUT THE ANSWER YOU’VE SELECTED. NOTE THAT THIS EXAM WAS DESIGNED TO BE TAKEN IN ONLY 50 MINUTES.

The following exam consists of 13 multiple choice questions, each worth 7 points, and one hand-graded problem, worth 9 points. You may, if you wish, use a 3 x 5 note card as an aid on this exam. Record all multiple choice answers on your scantron sheet. You may write on this exam as you wish, but the scantron will record your "official" answers to the multiple choice problems.

Work carefully; be sure to answer the question posed. If any question seems unclear or ambiguous to you, raise your hand, and I will try to clarify it.

You have 50 minutes to complete this test. Good luck.

Pledge:

On my honor as a JMU student, I have read and understand the directions above. I pledge that I have neither given nor received unauthorized help on this examination.

Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO!!!

Problems 1 - 6 deal with the game described below.

You are required to play the game “Hot Stack”. Four playing cards (three black, one red) are shuffled together, then dealt (face down) into two stacks of two cards each. We’ll call these the “left stack” and the “right stack”. You choose one of the stacks and reveal its cards. You are then paid $12 for each black card in your stack, but must pay $30 for any red card in your stack. Thus, a double black, or “hot” stack, pays $24. The red-black “cold” stack costs you $18.

If you wish, before you make your choice, you make remove the top card from the left stack, look at it, then throw it away. The left stack then has only one “pay card” remaining in it—$12 or -$30. What should you do?

The decision tree for this problem appears below. Study it carefully. The three locations marked #1, #2, and #3 are values which you must supply for questions 1, 2, and 3.

1. The number indicated by **#1** in the tree above is



1. –18 b) -4 c) -3 d) -2 e) 24
2. The number indicated by **#2** in the tree above is

a) 1.5 b) 3 c) 3.75 d) 4.5 e) 13.5

1. The number indicated by **#3** in the tree above is

a) -18 b) –2 c) 12 d) 0 e) 24

1. The optimal strategy given by the tree is
2. Look at the top card.
3. Don’t look at the top card.
4. Look at the top card. Pick the left stack if the revealed card is black, but pick the right stack if the revealed card is red.
5. Don’t look at the top card. Pick the left stack.
6. Look at the top card. The card is red. Pick the right stack and win $24.
7. The value marked **#1** tells us
8. how much you’d be guaranteed to make if you looked at the top card, found it black, then chose the right stack.
9. your expected winnings if you follow the optimal strategy.
10. your expected winnings if you look at the top card and it is black (assuming you are following the optimal strategy).
11. your mean winnings if your strategy is "always immediately choose the right stack".
12. none of these is the correct interpretation of the value marked **#1**
13. Consider looking at the top card of the left stack as (free) research. Then the EVSI of this research is

a) $0 b) $1.50 c) $3 d) $4.50 e) $12

END OF THE HOT STACK SCENARIO

Questions 7-14 use the information below. Read the scenario carefully.

Stanley Lord is about to make a print run for a new book, *Favorite Quant Bedtime Stories*, and is trying to decide whether to print 2000 or 4000 copies. Each copy that he **prints** costs his department $1. When a copy of the book is **sold**, though, his department receives all of the revenue generated from the sale. The demand for the book depends, in part, on the price of the book. (The demand, of course, is the number of copies of the book that consumers are willing to buy.) Stanley's superiors at the print house are currently deciding what the selling price of the book is to be, and so he has delayed his decision of the size of his print run until that information becomes available. He knows that his superiors will set the price for the book at either $5 or $10 per copy. At these prices, Stanley decides the demand for the book will be 1000, 2000, or 4000 copies. Stanley sits down and considers the various price-demand combinations, assigning probabilities to each. The results of his analysis are shown below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Demand = 1000 | Demand = 2000 | Demand = 4000 |  |
| Selling Price = $5 | 0.1 | 0.2 | 0.3 |  |
| Selling Price = $10 | 0.2 | 0.1 | 0.1 |  |
|  |  |  |  |  |

So, for example, Stanley has decided that the combination of a $5 selling price and a 4000 copy demand for the book has a 30% chance of occurring, while the combination of a $10 selling price and a 1000 copy demand has a 20% chance of occurring. **All questions based on this scenario assume that this analysis of Stanley's is correct.** *Note that it is perfectly appropriate to view the table above as the "corner" (AND) table in our contingency table work.*

Stanley's goal is to maximize the profit his department makes on the printing and sale of the book.

7. The probability that the book's selling price will be $10 is

a) 20% b) 30% c) 40% d) 50% e) 60%

1. Suppose that the selling price of the book ends up being $5. Then the probability that the demand will be 2000 copies is

a) 1/6 b) 1/5 c) 1/4 d) 1/3 e) 1/2

1. The probabilities in the table show that selling price and demand are
2. mutually exclusive events
3. completely exhaustive events
4. complementary events
5. independent random variables
6. dependent random variables
7. Suppose Stanley builds the decision tree for his problem. The first node in the tree will be
8. a decision node for how many copies he should print
9. a chance node for the selling price of the book
10. a decision node for the selling prince of the book
11. a chance node for the number of copies demanded
12. a decision node for the number of copies sold

For questions 11-13 we extend the Stanley Lord scenario as follows.

Stanley, after much deliberation, has decided that he will print 4000 copies of the book. In this way, he is assured of meeting demand for the book. (That is, the number of books demanded will be the same as the number of books sold.) He also defines the following decision variables:

**DEM** = the number of copies of the book demanded (and sold)

**PRICE** = the selling price of one copy of the book in dollars

**REV** = the total dollars of revenue generated by the sale of copies of the book

**PROFIT**  = the total dollars of profit generated by the sale of copies of the book

Note that **REV = DEM × PRICE** and that **PROFIT = REV – 4000**. Calculation will show that

E(**DEM) =** 2500 and E(**PRICE**) = 7.

1. The expected revenue for Stanley's department is
2. E(**PROFIT**)
3. E(**REV – 4000**)
4. E(**DEM**) × E(**PRICE**), because **DEM** and **PRICE** are independent
5. E(**DEM**) × E(**PRICE**), because **DEM** and **PRICE** are dependent
6. none of the above is correct
7. The expected profit for Stanley's department is
8. E(**REV –** 4000)
9. E(**REV**) – E(4000)
10. E(**REV**) – 4000
11. all of a)-c) are correct
12. none of a)-c) is correct
13. Which of the following calculations would be appropriate if Stanley wished to use the definition of expected value to compute E(**REV**)?
14. 2500 × 7
15. 5(.6) + 6(.4)
16. 1000(.3) + 2000(.3) + 4000(.4)
17. [1000(.3) + 2000(.3) + 4000(.4)] × [5(.6) + 10(.4)]
18. 5000(.1) + 10000(.2) + 20000(.3) + 10000(.2) + 20000(.1) + 40000(.1)

END OF THE STANLEY LORD SCENARIO

Problem A: (9 points) Recall the child’s game of Rock-Paper-Scissors? Each player secretly chooses “Rock”, “Paper”, or “Scissors”, and then they simultaneously reveal their choices to one another. Rock beats Scissors, Scissors beats Paper, and Paper beats Rock.

You have agreed to play a round of Rock-Paper-Scissors against a friend who (you know) always makes her decision by rolling a die. On a roll of 1, 2, 3, or 4, she says “Rock”, and on a roll of 5 or 6 she says “Paper”. She never says “Scissors”. The winner of the game will get $1 from the loser. If both players choose the same object (Rock, Paper, or Scissors), then no money is exchanged.

In the space below, construct the decision tree for this game. Include labels on all branches, probabilities on all chance branches, and payoffs at the end of each tree path. YOU NEED NOT ROLL BACK THIS TREE.

This rectangle covers the answer. To see the answer, just click on this BOARDER of this rectangle and press the DELETE key on your keyboard.

If only some letters disappear, you clicked inside the rectangle. Try again.

