MATH 1330/1430 FINAL EXAM
FORM A
FALL 2011

NAME:

Directions:

(1) Show ALL of your work in your blue book. Clearly separate your work for each problem.

(2) Clearly mark your answer in your blue book AND on the answer sheet provided. Only answers in your blue book and on the answer sheet will be graded.

(3) Write your name clearly on the exam, the answer sheet, and your blue book.

(4) This test consists of 14 problems (many with multiple parts) on 4 pages printed front and back. Take care not to forget any of the problems.

PROBLEM 1

Garlands Galore has a monthly fixed cost of \$10,000 and a variable cost of \$5 per garland produced. Furthermore, the garlands sells for \$15 each.

(I) What is Garlands Galore's cost function?

- **(A)** $C(x) = 5x + 10000$
- **(B)** $C(x) = 15x + 10000$
- **(C)** $C(x) = 5x - 10000$
- **(D)** $C(x) = 15x - 10000$
- **(E)** None of the above.

(II) What is Garlands Galore's revenue function?

- **(A)** $R(x) = 5x$
- **(B)** $R(x) = 10000x$
- **(C)** $R(x) = 10x$
- **(D)** $R(x) = 15x$
- **(E)** None of the above.

(III) What is Garlands Galore's profit function?

- **(A)** $P(x) = 10x + 10000$
- **(B)** $P(x) = 5x + 10000$
- **(C)** $P(x) = 10x - 10000$
- **(D)** $P(x) = 5x - 10000$
- **(E)** None of the above.

PROBLEM 2

Peppermint Pleasures, a gourmet candy cane manufacturer, has a monthly revenue function of $R(x) = 5x$ where x is the number of candy canes manufactured. Their current process for manufacturing candy canes has a monthly cost function of $C_1(x) = 3x + 900$. The executives at Peppermint Pleasures are considering a new manufacturing process that will have a monthly cost function of $C_2(x) = 2x + 1500$.

(I) What is the break-even point for the current process?

- **(A)** (300,1500)
- **(B)** (450,2250)
- **(C)** (450,0)
- **(D)** (300,0)
- **(E)** None of the above.

(II) What is the break-even point for the new process?

- **(A)** (500,0)
- **(B)** (500,2500)
- **(C)** (750,0)
- **(D)** (750,3750)
- **(E)** None of the above.

(III) If Peppermint Pleasures manufactures 800 candy canes a month, which process should they choose?

- **(A)** Keep the current process with cost function $C_1(x) = 3x + 900$.
- **(B)** Change to the new process with cost function $C_2(x) = 2x + 1500$.

PROBLEM 3

Beautiful Trees makes Christmas trees that are pre-lit and pre-decorated. They have a supply function of $s(x) = x^2+6x+500$ and a demand function of $d(x) = -x^2 - 4x + 600$, where x is in thousands of trees and $s(x)$ and $d(x)$ are in dollars.

(I) At what price will Beautiful Trees make 7000 trees available?

- **(A)** \$591
- **(B)** \$523
- **(C)** \$49,042,500
- **(D)** \$0
- **(E)** None of the above.

(II) What is Beautiful Trees' equilibrium quantitiy?

- **(A)** 5 trees
- **(B)** 5000 trees
- **(C)** 23 trees
- **(D)** 0 trees
- **(E)** None of the above.

(III) What is Beautiful Trees' equilibrium price?

- **(A)** \$25,030,500
- **(B)** \$600
- **(C)** \$500
- **(D)** \$555
- **(E)** None of the above.

PROBLEM 4

Mrs. Claus invests $100,000 at a rate of 4.5% per year compounded continuously. How long will it take for her investement to double if she makes no additional deposits or withdrawals? (Round your answer to 2 decimal places.)

(A) 15.75 years

(B) 15.40 years

(C) 10.75

(D) 20.40

(E) None of the above.

PROBLEM 5

Five years ago Kris Kringle invested a sum of money into an account earning interest at a rate of 6% per year compounded quarterly. If his investment if now worth $35,000, how much did he originally invest? (Round your answer to 2 decimal places.)

(A) $25,986.46

(B) $25,928.64

(C) $25,000.00

(D) $32,900.00

(E) None of the above.

PROBLEM 6

Rudolf anticipates that he will need a nose job in ten years. After discussing this with his plastic surgeon, he has calculated that the procedure will cost $10,000. If Rudolf is to have the necessary amount, how much must he deposit each month into his savings account that earns interest at a rate of 3.75% per year compounded monthly? (Round your answer to 2 decimal places.)

(A) $100.06

(B) $6,876.91

(C) $68.81

(D) $6,872.89

(E) None of the above.

PROBLEM 7

Frosty has decided to purchase a house. He obtains a conventional 30-year mortgage that charges interest at a rate of 6.5% per year compounded monthly and makes monthly payments of $975.

(I) If Frosty made a $20,000 down payment before obtaining the loan, what was the purchase price of his house? (Round your answer to 2 decimal places.)

(A) $154,255.55

(B) $1,078,523.64

(C) $174,255.55

(D) $1,098,523.64

(E) None of the above.

(II) How much did Frosty pay in interest over the life of the loan? (Round your answer to 2 decimal places.)

(A) $176,744.45

(B) $727,523.64

(C) $747,523.64

(D) $196,744.45

(E) None of the above.

PROBLEM 8

The North Pole Chapter of the EWO (Elf Workers Organization) has 85 members.

(I) How many ways can a president, vice president, secretary, and treasurer be chosen from the 85 members?

(A) 2,024,785

(B) 48,594,840

(C) 340

(D) 85

(E) None of the above.

(II) How many ways can a committee of 5 elves be chosen from the 85 members?

(A) 3,936,182,040

(B) 425

(C) 32,801,517

(D) 85

(E) None of the above.

(III) If 45 of the members are male and 40 of the members are female, how many ways can a committee of 6 elves be chosen if half must be male and half must be female?

(A) 5,047,099,200

(B) 16,200

(C) 140,197,200

(D) 1,800

(E) None of the above.

PROBLEM 9

375 shoppers were asked the questions, "Does your family celebrate Christmas, Hanukkah, or Kwanzaa?" Below are the results of the survey.

117 celebrate Christmas.

117 celebrate Hanukkah.

100 celebrate Kwanzaa.

22 celebrate Christmas and Hanukkah.

26 celebrate Christmas and Kwanzaa.

23 celebrate Hanukkah and Kwanzaa.

10 celebrate all three.

(I) How many people only celebrate Kwanzaa?

- **(A)** 61
- **(B)** 100
- **(C)** 90
- **(D)** 71
- **(E)** None of the above.

(II) How many people celebrate exactly two of the holidays?

- **(A)** 222
- **(B)** 41
- **(C)** 71
- **(D)** 10
- **(E)** None of the above.

(III) How many people celebrate none of the holidays?

- **(A)** 102
- **(B)** 72
- **(C)** 42
- **(D)** 100
- **(E)** None of the above.

PROBLEM 10

If Prancer flips a coin 5 times, what is the probability that

(I) it will land on tails exactly 3 times? (Round your answer to 4 decimal places.)

- **(A)** .2500
- **(B)** .5000
- **(C)** 1.0000
- **(D)** .3125
- **(E)** None of the above.

(II) it will land on tails on the first and third flip? (Round your answer to 4 decimal places.)

- **(A)** .3125
- **(B)** .5000
- **(C)** .2500
- **(D)** 1.0000
- **(E)** None of the above.

PROBLEM 11

The Dollar Bargain Store has a bin of 100 used Christmas CDs, of which 10 are scratched. If Jane selects 5 CDs, what is the probability that

(I) exactly 2 of the CDs are scratched? (Round your answer to 4 decimal places.)

- **(A)** .0011
- **(B)** .0021
- **(C)** 0
- **(D)** .0702
- **(E)** None of the above.

(II) at least 1 of the CDs is scratched? (Round your answer to 4 decimal places.)

- **(A)** .5263
- **(B)** .4162
- **(C)** .0011
- **(D)** 0
- **(E)** None of the above.

PROBLEM 12

Light of the World manufactures candles using three machines. Machine A produces 35% of the candles, Machine B produces 30% of the candles, and Machine C produces 35% of the candles. Of the candles produced on Machine A, 1% are found to be defective. Of the candles produced on Machine B, 2% are found to be defective. Of the candles produced on Machine C, 1.5% are found to be defective.

(I) What is the probability that a candle selected randomly for inspection will be defective? (Round your answer to 4 decimal places.)

(A) .0148

(B) .9852

(C) .0450

(D) .5000

(E) None of the above.

(II) What is the probability that a randomly selected candle was produced by Machine B given that it is defective?

(A) .3000

(B) .0200

(C) .4068

(D) .0060

(E) None of the above.

PROBLEM 13

Lots 'O Nuts is a local walnut sheller. They use four machines to shell walnuts. The probability that Machine I will break down is .01, the probability that Machine II will break down is .02, the probability that Machine III will break down is .02, and the probability that Machine IV will break down is .015. Assuming independence, what is the probability that none of the machines will break down? (Round your answer to 4 decimal places.)

(A) .9365

(B) .00000006

(C) .9999

(D) 1

(E) None of the above.

PROBLEM 14

The market for tinsel is currently dominated by two brands, SliverBrite and EverShine. A new brand, Christmas Reflections, is attempting to compete. Their marketing department estimates that each year SilverBrite will lose 15% of its customers to the new brand and 5% to EverShine. Evershine will lose 20% of its customers to the new brand and 10% to Silverbrite. Christmas Reflections will lose 12% of its customers to SilverBrite and 3% to Evershine. Currently, SilverBrite has 55% of the market share, Evershine has 30% of the market share, and Christmas Reflections has 15% of the market share.

(I) If these trends continue, what percentage of the market share will Christmas Reflections have in 3 years? (Round your answer to 2 decimal places.)

(A) 41.99%

(B) 40.59%

(C) 17.42%

(D) 27.00%

(E) None of the above.

(II) Assuming these trends continue, what percentage of the market share will Christmas Reflections have in the long run? (Round your answer to 2 decimal places.)

(A) 36.79%

(B) 11.32%

(C) 51.89%

(D) 27.00%

(E) None of the above.