Math 1313 Final Exam Review

Example 1: Find the equation of the line containing points (1,2) and (2,3).

Example 2: The Ace Company installed a new machine in one of its factories at a cost of $20,000. The machine is depreciated linearly over 10 years with a scrap value of $2,000. Find the value of the machine after 5 years.

Example 3: The AC Florist Company got a new delivery van at a cost of $28,000. The van is depreciated linearly over 5 years and has no scrap value. Find the value of the machine after 2 years.

Example 4: 4. A manufacturer has a monthly fixed cost of $1200 and a production cost of $2.50 for each unit produced. The product sells for $10 per unit.

a. What is the cost function?

b. What is the revenue function?

c. What is the profit function?

d. What is the break- even point?

Example 5: Solve using Gauss-Jordon.

$$\begin{aligned} x - 5y + z &= 5 \\ -y + z &= 2 \\ 3x + 2y + z &= 11 \end{aligned}$$

Example 6: Given the following matrices are in row reduced form. State the solution, if it exists to the system of equations.

$$\begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 6 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 4 \end{bmatrix}$$

Example 7: Solve for a, b, c and d.

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} - \begin{bmatrix} 2 & -1 \\ -5 & 6 \end{bmatrix} = \begin{bmatrix} 4 & 3 \\ -2 & 4 \end{bmatrix}$$

Example 8: Find the transpose of the following matrices.

$$A = \begin{bmatrix} -2 & 3 & 2 \\ 1 & 0 & 4 \end{bmatrix} \qquad B = \begin{bmatrix} 2 & 2 & 1 \\ 0 & -1 & 3 \\ 1 & 2 & 4 \end{bmatrix}$$

Example 9: Find the product, if possible.

$$\begin{bmatrix} 1 & -1 & 0 & 1 \\ 2 & 1 & 2 & 0 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 1 & 0 \\ -1 & 2 \end{bmatrix}$$

Example 10: Find the product, if possible

$$\begin{bmatrix} 2 & 1 \\ 1 & 0 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -1 \end{bmatrix}$$

Example 11: Find the inverse of the following matrix

$$\begin{bmatrix} 5 & 3 \\ -4 & 6 \end{bmatrix}$$

Example 12: A manufacturer of stereo speakers, makes two kinds of speakers, an economy model which sells for $50 and a deluxe model which sells for $200. The deluxe model uses 1 woofer and 2 tweeters. The economy uses 1 woofer and 1 tweeter. The manufacturer currently has 20 woofers and 45 tweeters in inventory. Set-up the problem to maximize income from the sale, use x for economy and y for deluxe.

Example 13: Maximize the following Linear Programming Problem.

$$Max\ P = 3x + 2y$$
$$st:\ 2x + 3y \leq 12$$
$$2x + y \leq 8$$
$$x, y \geq 0$$

Example 14: Minimize the following Linear Programming Problem.

$$Min\ C = x + y$$
$$st:\ 3x + 2y \geq 12$$
$$x + 3y \leq 11$$
$$x, y \geq 0$$

Example 15: Find the accumulated amount at the end of 6 months on a $2000 bank deposit paying simple interest at a rate of 3% per year.

Example 16: Dave invested a sum of money 3 years ago in a savings account that has since paid interest at the rate of 4.5% per year compounded monthly. His investment is now worth $5,721.24. How much did he originally invest?

Example 17: Mike pays $300 per month for 4 years for a car, making no down payment. If the loan borrowed costs 7% per year compounded monthly, what was the original cost of the car? How much interest will be paid?

Example 18: Steve bought a car for $30,000 . He put down 10% and financed the balance. His bank charged him 5% compounded monthly for 5 years. What is the monthly payment?

Example 19: George decided to deposit $4,000 to pay for a cruise he plans to take in 2 years. His bank pays 3.5% annual interest compounded semiannually. How much will he have in his account at the end of two years?

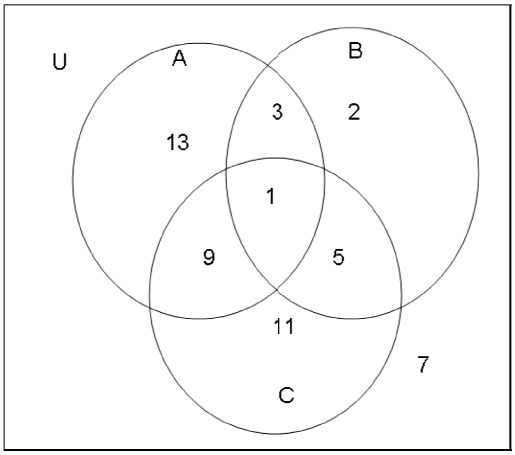
Example 20: Sandy decided to save some money for her daughter's college education. She decided to save $500 per quarter. Her credit union pays 4.5% annual interest compounded quarterly. How much money will she have available when her daughter starts college in 10 years?

Example 21: Let U={1,2,3,4,5,6,7,8,9,10},A = {1,3,5,7,9}, B={2,4,6,8,10}, C={1,2,4}

a. $B \cap C^c$

b. $A \cup B^c$

Example 22: Given the Venn Diagram.



a. $n[B \cup (A^C \cap C^c)]$

b. $n[B \cap (A^C \cap C^c)]$

Example 23: In a group of 300 hundred students, 125 are currently taking a math class and 175 are taking a history class and 70 are taking both classes. How many students in this group are taking a math class or a history class but not both?.

Example 24: Suppose a person planning a banquet cannot decide how to seat 6 honored guests at the head table. In how many arrangements can they seated in the 6 chairs on one side of the table?

Example 25: In how many ways can a president, vice president, secretary, and treasurer be selected from an organization of 20 members?

Example 26: You are going to make a serial number which can have no repeats and contains 3 digits and two letters. A zero cannot be the first digit. How many serials numbers are possible?

Example 27: A car dealer is offering special pricing on a truck. It has four models, six exterior colors, 3 interior colors, four choices of seat coverings and 3 stereo systems. If you can only choose one in each category, how many different trucks could be constructed?

Example 28: Find the number of ways in which 8 members of the space shuttle crew can be selected from 20 available astronauts.

b. The command structure on a space flight is determined by the order in which astronauts are selected for the flight. How many different command structures are possible if 8 astronauts are selected from 20 that are available?

c. If 14 men and 6 women are available for a space shuttle flight, in how many crews are possible that have 5 men and 3 women?

Example 29: A box contains 2 red marbles and 3 black marbles. Two marbles are drawn in succession without replacement. Find the following:

a. Find the probability the second marble is red?

b. Find the probability that both marbles are the same color?

c. Find the probability that the second marble is black given the first marble is red?

d. Find the probability that first marble red given that the second marble is red?

Example 30: Let E and F be events of a sample space S. Let $P(E^C) = 0.69$, $P(F) = 0.36$ and $P(E \cap F) = 0.15$. Find $P(E \cup F)$.

Example 31: Urn I contains 3 red and 4 white marbles and Urn II contains 5 red and 2 white marbles. Each Urn has an equally likely probability of being chosen. Find the following probabilities if a marble is chosen:

a. What is the probability that Urn I is selected and a red marble?

b. What is the probability that a red marble is chosen?

c. What is the probability that Urn I is selected given that a red marble has been selected?

d. What is the probability that a white marble is chosen given that Urn II was selected?

Example 32: 30. A sample of 6 fuses is drawn from a lot containing 10 fuses and 2 defective fuses. Find the probability that the number of defective fuses is:

a. Exactly 1?

b. No defective fuses?

c. At least 1 defective fuses?

Example 33: The probability distribution for a random variable X is given below. Calculate the expected value.

X	14	16	18	20
P(X=x)	0.34	0.31	0.26	0.09

Example 34: Consider the following Binomial experiment. The probability that a new employee at a manufacturing plant is still employed after one year is 0.9. Seven people have recently been hired by the company.

a. What is the probability that exactly 4 of these new employees will still be employed after one year?

b. What is the probability that at least 6 of the new employee's will still be employed after one year?

c. Calculate the mean of new employees that will still be employed after one year?

d. Calculate the standard deviation.

Example 35: Z is a standard normal random variable.

a. Calculate $P(Z > 0.19)$.

b. Calculate $P(-2.07 < Z < -1.63)$.

c. Find the z value, $P(Z > z) = .9115$

d. Find the value of z, $P(-z < Z < z) = .8444$

Example 36: Suppose X is a normal random variable with $\mu = 380$ and $\sigma = 20$. Find the value of:

a. $P(X < 405)$

b. $P(X > 330)$

Example 37: Use the normal distribution to approximate the following binomial distribution. Consider the random sample of 100 drivers on interstate 10 in Texas, where 29% of the drivers exceed the 70 mph speed limit. Find the probability that fewer than 40 drivers exceed the speed limit.