This is a sample multiple choice final. The questions cover ALL the sections of the book and so many are not needed for your class. Skip the questions that are over subjects you didn't cover.

Some changes are

Use (e) for none of the above (there is at least one)

the ' symbol for sets means complement

Question 33 is a population (if your class covered the difference between a sample and population)

We have not done grouped data in this class, so skip question 34

1. Write an equation in standard form for the line through $(3, -5)$ and $(-3, 7)$.

(a) $x + 2y = 1$ (b) $2x + y = 11$

(c) $x + 2y = -7$ (d) $2x + y = 1$

2. Joe received \$5000. He invested some of the money at 6% and the rest at 8%. He earns \$380 in simple interest for 1 yr. How much was invested at 8%?

(a) \$1000 (b) \$2000

(c) \$3000 (d) \$4000

3. If $f(x) = x^2 + 3$, find $f(3 + d)$.

(a) $d^2 + 12$ (b) $d^2 + 6d + 9$

(c) $d^2 + 6d + 12$ (d) $d^2 + 9$

4. Suppose that the variable cost of producing an item is \$300 and the fixed cost is \$200. Find a linear cost function for production of this item.

(a) $C(x) = 200x + 300$ (b) $C(x) = 300x + 200$

(c) $C(x) = 500x + 200$ (d) $C(x) = 300x$

5. A machine with a purchase price of \$12,500 has a scrap value of \$3700 and a 5-year life. Find the second-year straight-line depreciation.

(a) \$2500 (b) \$2346.67

(c) \$1760 (d) \$740

6. Give the solution of the system with the following augmented matrix.

$$\left[\begin{array}{cc|c} 1 & 0 & -2 \\ 0 & 6 & 18 \end{array}\right]$$

(a) (−2, 6) (b) (−2, 3)

(c) (−2, 18) (d) (−2, 9)

7. Use the Gauss–Jordan method to solve the following system of equations. Give only the x-value of the solution.

$$\begin{aligned} -4x + y &= -12 \\ 3y + 2z &= -18 \\ 2x - 3z &= 13 \end{aligned}$$

(a) 2 (b) −2 (c) 3 (d) No solution

8. If $A = \begin{bmatrix} 6 & 3 \\ 8 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$, find A + B.

(a) $\begin{bmatrix} 5 & 2 \\ 10 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 3 \\ 10 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 10 \\ 1 \end{bmatrix}$

(d) Not possible

9. If $A = \begin{bmatrix} 6 & 3 \\ 8 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$, find AB.

(a) $\begin{bmatrix} 0 & -4 \end{bmatrix}$ (b) $\begin{bmatrix} 0 \\ -4 \end{bmatrix}$ (c) $\begin{bmatrix} -6 & 6 \\ -8 & 4 \end{bmatrix}$

(d) Product does not exist.

10. If $A = \begin{bmatrix} 2 & 4 \\ -3 & 5 \end{bmatrix}$, find A^{-1}.

(a) $\begin{bmatrix} -2 & -4 \\ 3 & 5 \end{bmatrix}$ (b) $\begin{bmatrix} -1 & -\frac{3}{4} \\ 2 & -\frac{5}{2} \end{bmatrix}$ (c) $\begin{bmatrix} \frac{5}{22} & -\frac{2}{11} \\ \frac{3}{22} & \frac{1}{11} \end{bmatrix}$

11. Describe the graph of the inequality $2y + 4x < 8$.

(a) The region to the left of the dashed line $y = -2x + 4$

(b) The region to the right of the dashed line $y = -2x + 4$

(c) The region to the left of and including the solid line $y = -2x + 4$

(d) The region to the right of and including the solid line $y = -2x + 4$

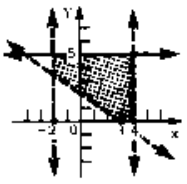
11. _____

12. Graph the feasible region for the following system of inequalities.

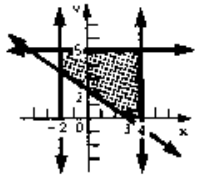
$$-2 < x < 4$$
$$0 \le y \le 5$$
$$2x + 3y > 6$$

12. _____

(a) 

(b) 

(c) 

(d) 

13. If the feasible region for a system has corner points (0, 8), (4, 3), and (5, 0), find the minimum value of the objective function $z = 6x + 4y$.

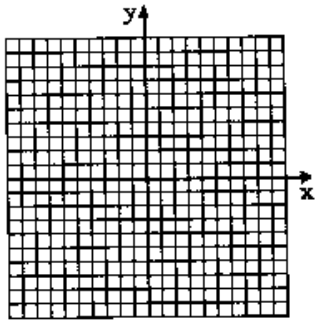
(a) 36 (b) 32 (c) 30 (d) 24

13. _____

14. Use the graphical method to solve the following linear programming problem.

Maximize $z = 2x + 3y$

Subject to: $2x + 5y \le 10$
$x - y \ge 0$
$x \ge 0$
$y \ge 0$.



(a) 10 at (5, 0) (b) $\frac{50}{7}$ at $\left(\frac{10}{7}, \frac{10}{7}\right)$

(c) 15 at (0, 5) (d) No maximum value

14. _____

15. It takes 3 hr to build a planter box and 2 hr to paint it. It takes 4 hr to build a step-stool and 3 hr to paint it. A man has 12 painting hr and 8 building hr available. If x is the number of planter boxes and y the number of step-stools, which of the following systems of inequalities describes this problem?

(a) $3x + 2y \le 8$, $4x + 3y \le 12$, $x \ge 0, y \ge 0$

(b) $3x + 4y \le 8$, $2x + 3y \le 12$, $x \ge 0, y \ge 0$

(c) $3x + 8y \le 4$, $2x + 12y \le 3$, $x \ge 0, y \ge 0$

(d) $3x + 4y \le 12$, $2x + 3y \le 8$, $x \ge 0, y \ge 0$

16. Read the solution from the following simplex tableau.

$$\begin{array}{c} \begin{array}{ccccc} x_1 & x_2 & x_3 & x_4 & z \end{array} \\ \left[\begin{array}{ccccc|c} 3 & 0 & 3 & 1 & 0 & 17 \\ 4 & 1 & 5 & 0 & 0 & 20 \\ \hline -1 & 0 & 6 & 0 & 1 & 0 \end{array}\right] \end{array}$$

(a) $x_1 = 3,\ x_2 = 0,\ x_3 = 3,\ x_4 = 1,\ z = 17$

(b) $x_1 = -1,\ x_2 = 0,\ x_3 = 6,\ x_4 = 0,\ z = 1$

(c) $x_1 = 0,\ x_2 = 20,\ x_3 = 0,\ x_4 = 17,\ z = 0$

(d) $x_1 = 0,\ x_2 = 20,\ x_3 = 0,\ x_4 = 17,\ z = 1$

17. To solve a linear programming problem with the following initial simplex tableau, which element would be selected as the first pivot?

$$\begin{array}{c} \begin{array}{ccccc} x_1 & x_2 & x_3 & x_4 & z \end{array} \\ \left[\begin{array}{ccccc|c} 1 & 5 & 0 & 10 & 0 & 100 \\ 0 & 4 & 1 & 15 & 0 & 200 \\ \hline 0 & -6 & 0 & -10 & 1 & 0 \end{array}\right] \end{array}$$

(a) 10 (b) 15 (c) 5 (d) -6

18. Find the transpose of the following matrix.

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

(a) $\begin{bmatrix} 0 & 2 \\ -1 & 3 \\ 4 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & -1 \\ 1 & 4 \\ 2 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 4 \\ 3 & -1 \\ 2 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 4 \end{bmatrix}$

19. How many subsets does the set {a, b, c, d, e} have?

(a) 64 (b) 32 (c) 16 (d) 30

20. Which of the following statements is false?

(a) $7 \in \{7, 9, 12\}$ (b) $\{a, b\} \subseteq \{a, b\}$

(c) $6 \notin \{5, 6, 7\}$ (d) $\emptyset \subseteq \{5, 6, 7\}$

21. If A = {6, 8, 10, 12, 13} and B = {6, 8, 11, 15}, find $A \cup B$.

(a) {6, 8, 10, 12, 13} (b) {6, 8, 10, 11, 12, 13, 15}

(c) {6, 8} (d) $\emptyset$

22. Suppose that a single card is drawn from a standard 52-card deck. Find the probability that the card is a black seven.

(a) $\frac{1}{4}$ (b) $\frac{3}{14}$ (c) $\frac{1}{13}$ (d) $\frac{1}{26}$

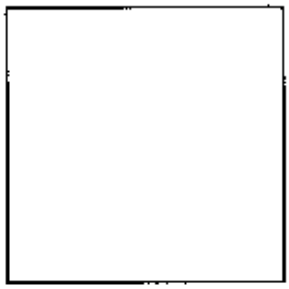
23. If $P(A) = .3$, $P(B|A) = .6$, $P(B'|A') = .1$, find $P(B'|A)$.

(a) $\frac{12}{19}$ (b) $\frac{7}{19}$ (c) $\frac{4}{25}$ (d) .9

24. A survey of members of a health club found that:

24 members swim;
32 members use exercise bikes;
20 members use weight machines;
8 members swim and use weight machines;
13 members use exercise bikes and weight machines;
12 members use exercise bikes only;
5 members swim, use exercise bikes, and use weight machines;
6 members do not swim and do not use either exercise bikes or weight machines.

Use a Venn diagram to determine how many members were surveyed.



(a) 120 (b) 82

(c) 48 (d) 54

25. Suppose that Greg has 6 shirts, 5 pairs of pants, and 3 pairs of shoes. How many outfits can he create if an outfit consists of 1 shirt, 1 pair of pants, and 1 pair of shoes?

(a) 150 (b) 30 (c) 90 (d) 14

26. Find the number of distinguishable permutations of the letters in the word "moose."

(a) 120 (b) 60 (c) 30 (d) 5

27. From a group of 6 boys and 3 girls, an after-school reading club of 2 boys and 2 girls is selected. How many such clubs are possible?

(a) 126 (b) 720 (c) 18 (d) 45

28. Georgia is taking a 5-question multiple choice quiz in which each question has 4 choices. She guesses on all of the questions. What is the probability that she answers exactly 2 of the questions correctly?

(a) $\frac{1}{16}$ (b) $\frac{27}{1024}$ (c) $\frac{135}{512}$ (d) $\frac{45}{512}$

29. If 3 balls are drawn from a bag containing 4 red, 3 blue, and 2 yellow balls, what is the expected number of yellow balls in the sample?

(a) 2 (b) 1 (c) $\frac{2}{9}$ (d) $\frac{2}{3}$

30. Suppose that a student has test scores of 70, 78, 80, and 94. What is the student's mean score?

(a) 322 (b) 79
(c) 80.5 (d) 80

31. Find the median for the following set of numbers.

6, 14, 9, 13, 12, 11

(a) 10.83 (b) 11.5
(c) 11 (d) No median

32. Find the mode or modes for the following set of numbers.

2, 1, 5, 2, 8, 5, 9

(a) 2 (b) 5
(c) 2 and 5 (d) No mode

33. Find the standard deviation for the following set of numbers. Round to the nearest hundredth.

15, 13, 20, 8, 22, 12

(a) 27.20 (b) 5.22
(c) 4.76 (d) 15.88

34. Find the mean for the following grouped data. Round to the nearest hundredth.

Interval	Frequency
1–3	8
4–6	12
5–7	20
8–10	32

(a) 6.72 (b) 5.72

(c) 7.72 (d) 5.50

35. The probability that a certain baseball team will win a given game is .46. If the team plays 100 games, find the expected number of wins and the standard deviation. (Round to the nearest hundredth if necessary.)

(a) $\mu = 4.98$; $\sigma = 46$ (b) $\mu = 46$; $\sigma = 6.78$

(c) $\mu = 46$; $\sigma = 4.98$ (d) $\mu = 46$; $\sigma = 7.35$

36. Which one of the following matrices could be a probability vector?

(a) $\begin{bmatrix} .3 & .6 & .1 \\ .4 & .2 & .4 \end{bmatrix}$ (b) $\begin{bmatrix} .7 & .5 & -.2 \end{bmatrix}$

(c) $\begin{bmatrix} .999 & .111 \end{bmatrix}$ (d) $\begin{bmatrix} .36 & .24 & .22 & .18 \end{bmatrix}$

37. Which one of the following matrices could be a transition matrix?

(a) $\begin{bmatrix} .6 & .4 & 0 \\ .1 & 0 & .9 \end{bmatrix}$ (b) $\begin{bmatrix} .75 & .35 \\ .25 & .65 \end{bmatrix}$

(c) $\begin{bmatrix} .32 & .68 \\ .41 & .59 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & -1 \\ -3 & 4 \end{bmatrix}$

38. Suppose that

$$A = \begin{bmatrix} .2 & .8 \\ .1 & .9 \end{bmatrix}$$

is a transition matrix. What is the probability that state 1 changes to state 2 after two repetitions of the experiment?

(a) .89 (b) .88 (c) .80 (d) .12

39. Which one of the following transition matrices is *not* regular?

(a) $\begin{bmatrix} .1 & .2 & .7 \\ .3 & .3 & .4 \\ .1 & .1 & .8 \end{bmatrix}$ (b) $\begin{bmatrix} .2 & .4 & .2 \\ 0 & 0 & 1 \\ .1 & .3 & .3 \end{bmatrix}$

(c) $\begin{bmatrix} .9 & .1 \\ .3 & .7 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

40. Find all absorbing states for the following transition matrix.

$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{bmatrix} 1 & 0 & 0 \\ .2 & .3 & .5 \\ 0 & 0 & 1 \end{bmatrix} \end{array}$$

(a) State 1 only (b) State 2 only

(c) State 3 only (d) States 1 and 3

41. A farmer must decide whether to irrigate his fields. The payoff matrix for a given week is as follows.

$$\begin{array}{r} \\ \text{Irrigate} \\ \text{Don't Irrigate} \end{array} \begin{array}{c} \begin{array}{cc} \text{Rain} & \text{No Rain} \end{array} \\ \begin{bmatrix} -\$2500 & \$8000 \\ \$6200 & \$2100 \end{bmatrix} \end{array}$$

If there is a 40% chance of rain during the week, what strategy is best?

(a) Irrigate (b) Don't irrigate

(c) Both strategies are equally good.

42. In the following game, decide on the payoff when the strategy (3, 1) is used.

$$\begin{array}{cc} & B \\ & \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ A\begin{array}{c} 1 \\ 2 \\ 3 \end{array} & \begin{bmatrix} 4 & -2 & 1 \\ -3 & 0 & 2 \\ -6 & 3 & 0 \end{bmatrix} \end{array}$$

(a) $1 from A to B (b) $1 from B to A

(c) $6 from A to B (d) $6 from B to A

43. Remove any dominated strategies in the following game.

$$\begin{bmatrix} -3 & -2 & 5 \\ 2 & 1 & 6 \\ 4 & -2 & -3 \end{bmatrix}$$

(a) $\begin{bmatrix} 2 & 1 & 6 \\ 4 & -2 & -3 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 6 \\ -2 & -3 \end{bmatrix}$ (c) $\begin{bmatrix} 2 & 6 \\ 4 & -3 \end{bmatrix}$

(d) No dominated strategies

44. Find any saddle points for the following game.

$$\begin{bmatrix} 2 & -1 \\ -3 & 4 \\ 6 & 5 \end{bmatrix}$$

(a) 6 at (3, 1) (b) −1 at (2, 1)

(c) 5 at (3, 2) (d) No saddle point

45. Suppose that a game has payoff matrix

$$M = \begin{bmatrix} -2 & 3 \\ 2 & 0 \end{bmatrix}.$$

Suppose that player A chooses row 1 with probability .3 and player B chooses column 1 with probability .5. Find the expected value of the game.

(a) $.90 (b) $.85

(c) −$.85 (d) $1.05

46. Find the simple interest earned if $2450 is invested at 6% for 5 mo.

(a) $61.25 (b) $147

(c) $61.87 (d) $2511.25

47. Margaret Murphy opened a savings account with a deposit of $7500. The account pays 8% interest compounded quarterly. If no further deposits and no withdrawals are made, find the balance in Margaret's account at the end of 5 yr.

(a) $10,500 (b) $34,957.18

(c) $8100 (d) $11,144.61

48. Marc Rossoff wants to have $25,000 available 10 yr from now to buy a car. How much must he invest today, at 6% compounded monthly, so that he will have the required amount?

(a) $23,584.91 (b) $13,959.87

(c) $13,740.82 (d) $15,000

49. Find the sum of the first five terms of the geometric sequence with $a = 6$ and $r = -1/2$.

(a) $\frac{93}{8}$ (b) $-\frac{93}{16}$ (c) $\frac{8}{33}$ (d) $\frac{33}{8}$

50. Find the payment necessary to amortize a loan of $20,000 if the interest rate is 10% compounded quarterly and payments are made quarterly for 10 yr.

(a) $296.72 (b) $796.72

(c) $500 (d) $800

1. (d)
2. (d)
3. (c)
4. (b)
5. (c)
6. (b)
7. (a)
8. (d)
9. (b)
10. (c)
11. (a)
12. (b)
13. (c)
14. (a)
15. (b)
16. (c)
17. (a)
18. (d)
19. (b)
20. (c)
21. (b)
26. (b)
27. (d)
28. (c)
29. (d)
30. (c)
31. (b)
32. (c)
33. (b)
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35. (c)
36. (d)
37. (c)
38. (b)
39. (d)
40. (d)
41. (a)
42. (c)
43. (c)
44. (c)
45. (b)
46. (a)