This is an open-book exam. You may refer to your text and other course materials as you work on the exam, and you may use a calculator. **You must complete the exam individually. Neither collaboration nor consultation with others is allowed. Use of instructors' solutions manuals or online problem solving services in NOT allowed.**

Record your answers and work on the separate answer sheet provided, and upload it into the Final Exam folder in "Assignments". DO NOT UPLOAD THIS EXAM!

There are 25 problems.
Problems #1–12 are Multiple Choice.
Problems #13–15 are Short Answer. (Work not required to be shown)
Problems #16–25 are Short Answer with work required to be shown.

MULTIPLE CHOICE

1. This quarter, there is a 60% chance that Jason will pass Accounting, a 70% chance that he will pass English, and 80% chance that he will pass at least one of these two courses. What is the probability that he will pass both Accounting and English?

1. _____

A. 30% B. 65% C. 70% D. 50%

2. The Washingtons buy a $280,000 home by putting 20% down and financing the balance with a 30-year fixed-rate 3.9% mortgage, compounded monthly. What is the amount of their monthly loan payment to amortize the loan?

2. _____

A. $1320.67 B. $1056.54 C. $1687.78 D. $1350.22

3. A bag contains 5 red balls, 4 white balls, and 3 black balls. Two balls are drawn without replacement. What is the probability that at least one ball drawn is red?

3. _____

A. $\frac{20}{132} \approx 0.15$ B. $\frac{35}{132} \approx 0.27$ C. $\frac{55}{132} \approx 0.42$ D. $\frac{90}{132} \approx 0.68$

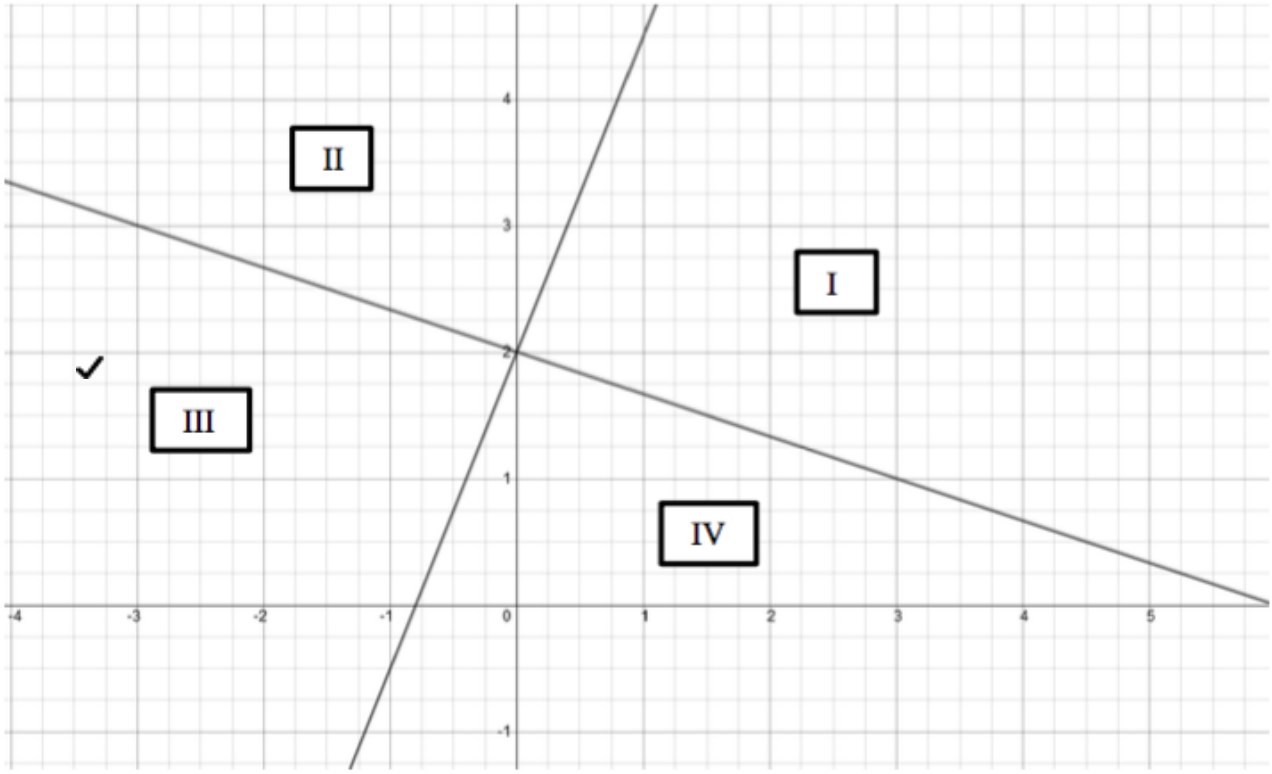
4. The mean time to get an oil change done at Leaky's Garage is 49 minutes, with a standard deviation of 11 minutes. Assuming a normal distribution, what is the probability that a randomly chosen customer experiences an oil change done between 49 and 71 minutes?

4. _____

A. 0.6826 B. 0.5000 C. 0.4772 D. 0.3413

5. Determine which region corresponds to the feasible region of the system of linear inequalities:

$$5x - 2y \geq -4$$
$$x + 3y \geq 6$$



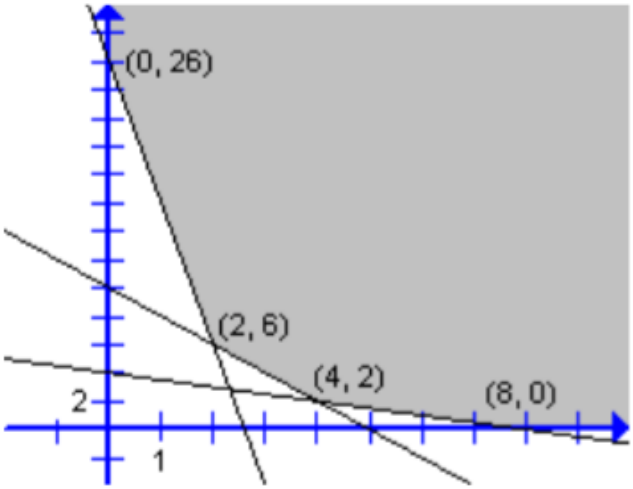
A. Region I
B. Region II
C. Region III
D. Region IV

5. _____

6. Find the equation of the line passing through $(5, -2)$ and $(-9, 6)$: 6. _____

A. $4x + 7y = 6$ B. $4x - 14y = -8$ C. $x + y = -3$ D. $x - y = 7$

7. Which of the corner points for the system of linear inequalities graphed below minimizes the objective function $C = 5x + 3y$?



7. _____

A. (8, 0) C. (2, 6)

B. (4, 2) D. (0, 26)

8. Identify the *single row operation* that transforms the matrix as shown: 8. _____

$$\left[\begin{array}{cc|c} 10 & -4 & 9 \\ -5 & 2 & -4.5 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 10 & -4 & 9 \\ -10 & 4 & -9 \end{array}\right]$$

A. $-2R_2 \rightarrow R_2$ C. $2R_2 + R_1 \rightarrow R_1$

B. $-0.5R_1 + R_2 \rightarrow R_2$ D. $R_1 + R_2 \rightarrow R_2$

9. – 10. An advertising agency has developed Internet and television ads for a particular business. Each Internet ad costs \$200 per run and each television ad costs \$500 per run. The business does not want the sum of Internet and television ads to be run to exceed 130 times. The agency estimates that each viewing of the Internet ad will reach 1000 people and each airing of the television ad will reach 1500 people. If the total amount to be spent on ads is not to exceed \$15,000, how many times should each type of ad be run so that the total number of people reached is a maximum? Let x represent number of times Internet ad runs and y represent number of times television ad runs.

9. Identify the cost constraint on ad spending:

9. _____

A. $200x + 500y \leq 15000$ C. $x + y \leq 130$

B. $200x + 500y \leq 130$ D. $x + y \leq 15000$

10. State the objective function.

10. _____

A. $P = 200x + 500y$ C. $P = 1000x + 1500y$

B. $P = 500x + 200y$ D. $P = 1500x + 1000y$

11. The amount of money you should deposit quarterly in an account paying 8% compounded quarterly in order to have $100,000 after 20 years can be determined using formula for:

11. _____

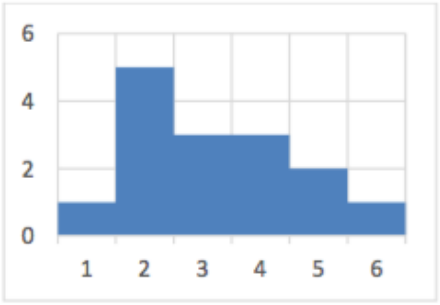
A. Single-payment, compound interest
B. Single-payment, simple annual interest
C. Periodic payments: present value of an annuity / installment payment on loan
D. Periodic payments: future value of an ordinary annuity

12. Which histogram below accurately reflects 15 survey responses presented in the following frequency table?

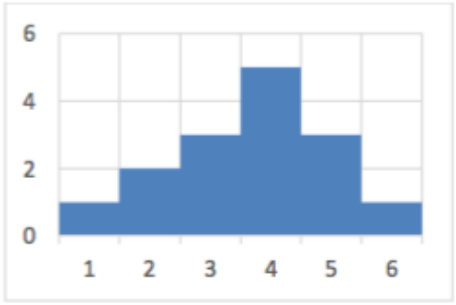
Value	Frequency
1	X
2	XX
3	XXX
4	XXXXX
5	XXX
6	X

12. _____

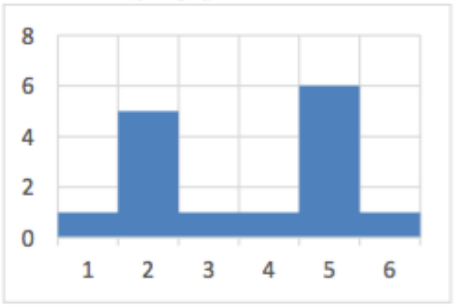
HISTOGRAM A



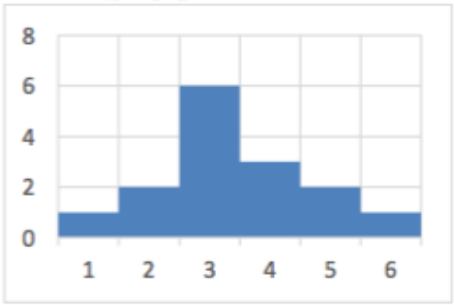
HISTOGRAM C



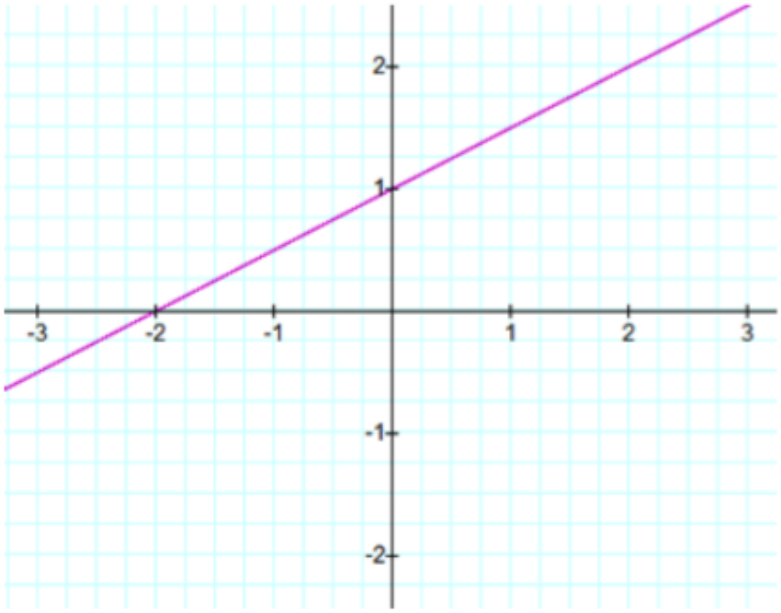
HISTOGRAM B



HISTOGRAM D



SHORT ANSWER (work NOT required to be shown)



13. For the line graphed at left:

    a. Determine the slope:

    _____

    b. Determine y – intercept if it exists:

    _____

    c. Express equation in *slope-intercept* form :

    _____

    d. Express equation in *general (standard)* form:

    _____

14. The Gallup Organization recently conducted a "straw poll" of 1500 randomly-selected American voters to determine their current Presidential candidate preferences. Voters were also asked their age in years (18 to 39 or 40+). Following table was obtained.

Presidential Candidate Preferred	Voter Age 18 - 39	Voter Age 40 +	Total
Democrat	227	273	500
Independent	184	310	494
Republican	115	391	506
Total	526	974	1500

(Report your answers as fractions or as decimal values *rounded to the nearest hundredth*.)

Find the probability that a randomly-selected American voter preferred:

(a) the Independent candidate and is age 18 – 39: Answer: _____

(b) the Independent candidate or is age 18 – 39: Answer: _____

(c) the Independent candidate given that voter is age 18 – 39: Answer: _____

15. Let $U = \{1,2,3,4,5,6,7,8,9,10\}$, $A = \{1,2,3,4,5\}$, $B = \{1,3,4,6\}$, and $C = \{2,4,6\}$.
List the members of the following sets:

a. $(A \cap B)$ Answer: _____

b. $(A \cup B) \cap C$ Answer: _____

c. $(A \cap B) \cup C$ Answer: _____

SHORT ANSWER, *with work required to be shown*, as indicated.

16. You are a restaurant manager. You must pick 12 entrees for your menu. There are 13 meat offerings and 6 poultry offerings to choose from. Order doesn't matter.

(a) In how many ways can 12 entrees be randomly selected out of the 19 meat and poultry offerings? **Show work.**

(b) In how many ways can 12 entrees be chosen, if 8 must be meat and 4 must be poultry? **Show work.**

(c) Using your answers to parts (a) and (b), if 12 entrees are randomly selected from the 19 offerings, what is the probability that 8 are meat and 4 are poultry? *Round answer to nearest ten-thousandth (4 places after decimal).* **Show work.**

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17. Solve the system of equations using substitution, elimination by addition, or augmented matrix methods (your choice). **Show work.**

$$2x - 3y = 5$$
$$3x + 5y = -21$$

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18. Find the principal P required to achieve a future amount A = \$5000 with an interest rate of 6% compounded quarterly for 5 years. *Round answer to nearest cent.* **Show work.**

19. In the United States, the high school dropout rate in 1980 was 14.1%. By 2005 the dropout rate was 9.4%.

a. **Multiple choice**: The linear regression model most closely fitting this data (where r represents high school dropout rate in percent and t represents years since 1980) is:

A. $r = 0.188t + 14.1$ C. $r = -5.3t + 14.1$

B. $r = 5.3t + 14.1$ D. $r = -0.188t + 14.1$

b. Use the model to predict high school dropout rate in 2022 (*give answer to nearest tenth of a percent)* **Show work!**

c. Fill in the blanks to interpret the slope of the equation: The rate of change of US high school dropout rate with respect to time is

_____ per _____. (Include units of measurement.)

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20. Bank A pays 4.8% compounded quarterly, while Bank B pays 4.79% compounded monthly. Which bank pays more? **Show work**

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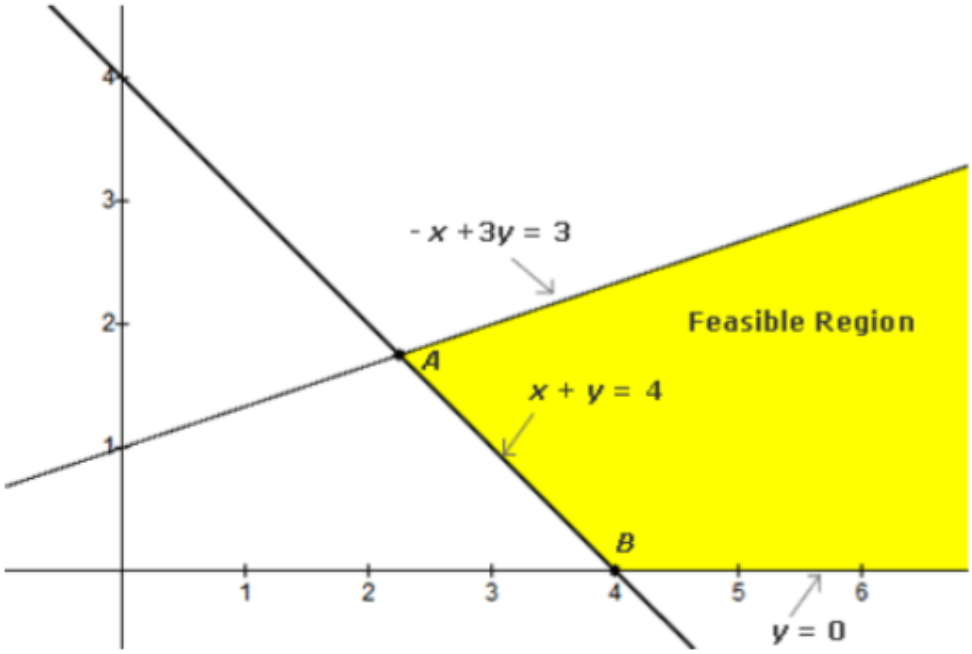
21. A seed company claims that 90% of its bean seeds will germinate. If eight of these seeds are planted in warm, moist, soil, what is the probability that exactly 7 of them will germinate? *Round answer to nearest ten-thousandth (4 places after decimal).* **Show work**

22. The feasible region shown below is bounded by lines $-x+3y=3$, $x+y=4$, and $y=0$. Find the coordinates of corner point *A*. **Show work.**



23. A network security specialist records the number of incoming e-mails containing links that six randomly-selected network users receive in a day. Numbers are 68, 78, 90, 78, 86, and 98.

(a) State the mode (if one exists).

(b) Find the median. **Show work/explanation.**

(c) Determine the sample mean. **Show work**

(d) Using the sample mean found in part (c), and given that the sample standard deviation of the data set above is 10.56, what percentage of the data set falls within one standard deviation of the mean? **Show work/explanation.**

(d) _____

A. 34.2%
B. 66.7%
C. 68.3%
D. 83.3%

24. In a European country, 20% of the families have three children, 40% have two children, 30% have one child, and 10% have no children. On average, how many children are there to a family?

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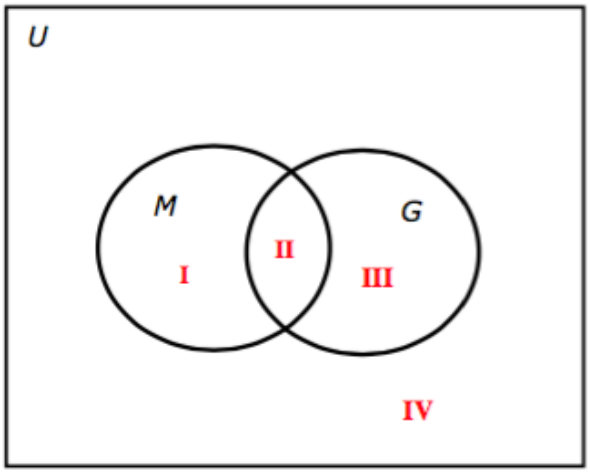
25. Mary McMath surveyed 64 students in a finite math class on what they most recently did for fun. 31 went to the movies, 45 went to the big football game, and 21 went to the movies and the big football game.

(a) What is the probability that a randomly selected student went to the movies or to the "big game"? **Show work.**

(b) Let M = {students who went to movies} and G = {students who went to the "big game"}. Determine the number of attendees belonging to each of the regions I, II, III, IV.



Region I: _____ Region II: _____ Region III: _____ Region IV: _____
