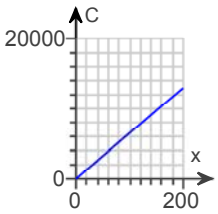
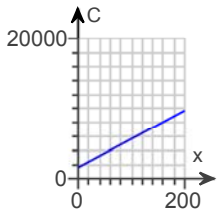
Student: _____	**Instructor:** Fred Szabo	**Assignment:** Math 208 Practice
Date: _____	**Course:** Finite Math (4)	questions for Final Exam - Fall 2017

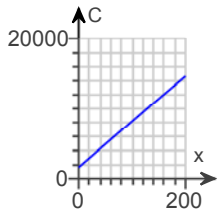
1. A plant can manufacture 50 golf clubs per day at a total daily cost of $4919 and 60 golf clubs per day for a total cost of $5569.
(A) Assuming that daily cost and production are linearly related, find the total daily cost, C, of producing x golf clubs.
(B) Graph the total daily cost for $0 \le x \le 200$.
(C) Interpret the slope and y intercept of the cost equation.

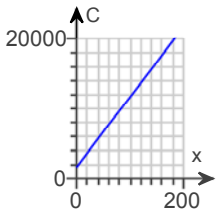
(A) C = Y=65x+1669
(Simplify your answer. Use integers or fractions for any numbers in the expression. Do not include the $ symbol in your answer.)

(B) Choose the correct graph of the total daily cost below.

○ **A.** 

○ **B.** 

☑ **C.** 

○ **D.** 

(C) Interpret the slope and y intercept. Choose the correct answer below.

○ **A.** The fixed cost and cost per club sum to the y intercept. The slope is the ratio of the two costs.
○ **B.** The y intercept is the cost per club and the slope is the fixed cost.
☑ **C.** The y intercept is the fixed cost and the slope is the cost per club.

---

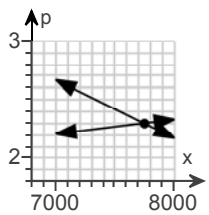
2. At a price of $2.22 per bushel, the supply of a certain grain is 7100 million bushels and the demand is 7900 million bushels. At a price of $2.27 per bushel, the supply is 7500 million bushels and the demand is 7800 million bushels.
(A) Find a price-supply equation of the form $p = mx + b$, where p is the price in dollars and x is the supply in millions of bushels.
(B) Find a price-demand equation of the form $p = mx + b$, where p is the price in dollars and x is the demand in millions of bushels.
(C) Find the equilibrium point.
(D) Graph the price-supply equation, price-demand equation, and equilibrium point in the same coordinate system.

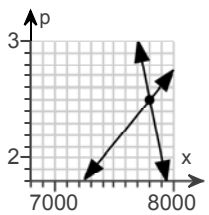
(A) The price-supply equation is p = _____.
(Type an exact answer. Use integers or decimals for any numbers in the equation.)

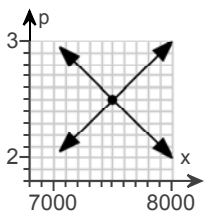
(B) The price-demand equation is p = _____.
(Type an exact answer. Use integers or decimals for any numbers in the equation.)

(C) The equilibrium point is _____.
(Type an ordered pair. Type an exact answer. Use integers or decimals for any numbers in the expression.)

(D) Choose the correct graph below.

○ **A.** 

○ **B.** 

○ **C.** 

---

3. Find the vertex form of the function. Then find each of the following.
(A) Intercepts **(B)** Vertex **(C)** Maximum or minimum **(D)** Range

$s(x) = 0.5x^2 - 4x + 13$

s(x) = _____
(Type your answer in vertex form. Use integers or decimals for any numbers in the expression.)

(A) State the y-intercept(s).
_____ (Use a comma to separate answers as needed. Type an integer or a decimal.)

State the x-intercept(s).

- ○ **A.** The x-intercepts are _____. (Use a comma to separate answers as needed. Type an integer or a decimal.)
- ☑ **B.** There are no x-intercepts.

(B) The vertex is (4, 5). (Type an ordered pair.)

(C) Does the function have a minimum or a maximum?

○ maximum ☑ minimum

The minimum or maximum value is (4).

(D) The range is y=>5. (Type an inequality, or use interval notation.)

4. Solve the following equation graphically to two decimal places using a graphing calculator.

$1.5x^2 - 1.3x - 5.2 < 0$

Which values of x, to two decimal places, satisfy the inequality?

- ○ **A.** $x > 2.34$
- ○ **B.** $x \leq -1.48$
- ○ **C.** $-1.48 < x < 2.34$
- ○ **D.** $x < -1.48$ or $x > 2.34$

5. For the following polynomial function, find (A) the degree of the polynomial, (B) all x-intercepts, and (C) the y-intercept.

$f(x) = (5x + 4)^4(x - 3)^5$

(A) The degree of the polynomial is 9.

(B) The x-intercept(s) is/are -.8, 3.
(Use a comma to separate answers as needed. Type integers or fractions.)

(C) The y-intercept is 0.
(Type an integer or a fraction.)

6. For the given rational function, (A) Find the intercepts for the graph. (B) Determine the domain. (C) Find any vertical or horizontal asymptotes for the graph. (D) Graph y = f(x) in a standard window using a graphing calculator.

$$f(x) = \frac{x-2}{x+2}$$

(A) What are the x-intercepts? Select the correct choice below and, if necessary, fill in the answer box within your choice.

- **A.** The x-intercept(s) is/are 2.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **B.** There are no x-intercepts.

What are the y-intercepts? Select the correct choice below and, if necessary, fill in the answer box within your choice.

- **A.** The y-intercept(s) is/are -1.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **B.** There are no y-intercepts.

(B) Determine the domain of f(x). Select the correct choice below and, if necessary, fill in the answer box within your choice.

- **A.** The domain is all real numbers.
- **B.** The domain is all real numbers except for -2.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **C.** The domain is not defined.

(C) What are the vertical asymptotes? Select the correct choice below and, if necessary, fill in the answer box within your choice.

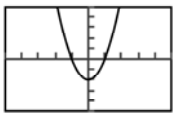
- ☑ **A.** The vertical asymptote(s) is/are x = 2.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **B.** There is no vertical asymptote.

What is the horizontal asymptote? Select the correct choice below and, if necessary, fill in the answer box within your choice.

- ☑ **A.** The horizontal asymptote(s) is/are y = 1.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **B.** There is no horizontal asymptote.

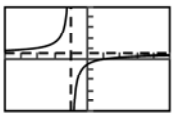
(D) Choose the correct graph of f(x).

A.



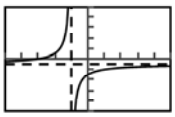
$-10 \le x \le 10$
$-10 \le y \le 10$

☑ **B.**



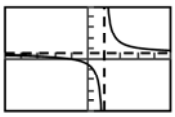
$-10 \le x \le 10$
$-10 \le y \le 10$

C.



$-10 \le x \le 10$
$-10 \le y \le 10$

D.



$-10 \le x \le 10$
$-10 \le y \le 10$

7. Solve the given equation for x. (Remember that $e^{-x} \neq 0$ for all values of x.)

$x e^{-x} + 2 e^{-x} = 0$

x = -2 (Use a comma to separate answers as needed.)

8. Find the value of an investment of $10,000 for 14 years at an annual interest rate of 3.15% compounded continuously.

The value of the investment is $ 15542.61 .
(Do not round until the final answer. Then round to the nearest cent as needed.)

9. Write the equation in equivalent logarithmic form.

$4 = 256^{\frac{1}{4}}$

What is the equivalent logarithmic form?

Log256^9=9

10. Write in terms of simpler forms.

$\log_d M^2$

$\log_d M^2$ = 2 log d^m

11. Convert the given time period to years, assuming a 360-day year.

4 months

4 months = 1/3 year (Simplify your answer.)

12. The principal P is borrowed and the loan's future value A at time t is given. Determine the loan's simple interest rate r to the nearest tenth of a percent.

P = $3000.00**, A = $**3191.25**, t =** 9 months

8.5 % (Round to the nearest tenth of a percent.)

13. If $3,000 is invested at 4% compounded quarterly, what is the amount after 6 years?

The amount after 6 years will be $ 3801.12 .
(Round to the nearest cent.)

14. If $4000 is invested at 7% compounded continuously, what is the amount after 7 years?

The amount after 7 years will be $ 6529.26 .
(Round to the nearest cent.)

15. Use the future value formula to find the indicated value.

n = 24; i = 0.03; PMT = $42; FV = ?

FV = $ 1445.91
(Round to the nearest cent.)

16. Use the future value formula to find the indicated value.

FV = $4541; n = 23; i = 0.04; PMT = ?

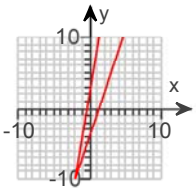
PMT = $ 124.01
(Round to the nearest cent.)

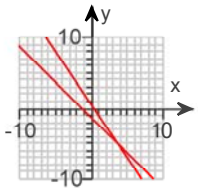
17. Match the system of equations below with its graph, and use the graph to solve the system.

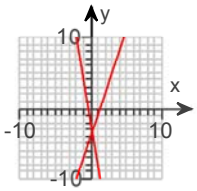
$$-3x - 3y = 4$$
$$6x + 4y = 2$$

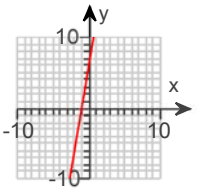
Convert to matrice

Which graph below is the graph of the system of equations?

○ **A.** 

☑ **B.** 

○ **C.** 

○ **D.** 

What is the solution to the system? Select the correct choice below and fill in the answer box within your choice.

○ **A.** The unique solution to the system is _____. (Type an ordered pair.)
○ **B.** There are an infinite number of solutions.
○ **C.** There is no solution.

18. Solve the system by the substitution method.

$$x - 3y = -2$$
$$y = -2x + 10$$

Select the correct choice below and fill in any answer boxes present in your choice.

○ **A.** The solution is (4,2). (Type an ordered pair.)
○ **B.** There are infinitely many solutions.
○ **C.** There is no solution.

19. Solve the system below using augmented matrix methods. Graph each solution set. Discuss the difference between the graph of an equation in the system and the graph of the system's solution set.

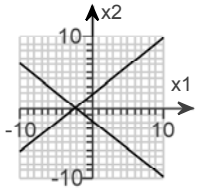
$$\begin{aligned} 4x_1 - 5x_2 &= -9 \\ -8x_1 + 10x_2 &= 18 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

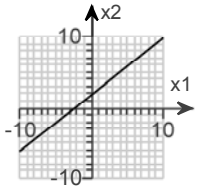
- **A.** The unique solution is $x_1 =$ _____ and $x_2 =$ _____. (Simplify your answers.)
- **B.** The system has infinitely many solutions. The solution is $x_1 =$ _____ and $x_2 = t$. (Simplify your answer. Type an expression using t as the variable.)
- **C.** There is no solution.

Which graph represents the solution set for the given system of equations?

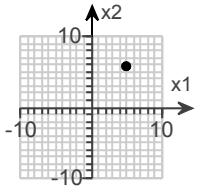
A.



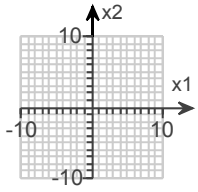
B.



C.



D.



What is the difference between the graph of an equation in the system and the graph of the system's solution set?

- **A.** The graph of an equation is a line whereas the graph of the solution set is a point.
- **B.** The graph of an equation is a point whereas the graph of the solution set is infinitely many points.
- **C.** The graph of an equation is a line whereas the graph of the solution set is a blank graph.
- **D.** There is no difference.

20. Solve using augmented matrix methods.

$$\begin{aligned} 5x_1 - x_2 &= 9 \\ x_1 + 4x_2 &= 6 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The unique solution is $x_1 =$ _____ and $x_2 =$ _____. (Simplify your answers.)
- **B.** The system has infinitely many solutions. The solution is $x_1 =$ _____ and $x_2 = t$. (Simplify your answer. Type an expression using t as the variable.)
- **C.** There is no solution.

21. Use row operations to change the matrix below to reduced form.

$$\begin{bmatrix} 1 & 4 & -4 & -1 \\ 0 & 5 & -10 & 1 \\ 0 & -1 & 2 & -\frac{1}{5} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 4 & -4 & -1 \\ 0 & 5 & -10 & 1 \\ 0 & -1 & 2 & -\frac{1}{5} \end{bmatrix} \sim \begin{bmatrix} \_\_\_\_\_ \\ \_\_\_\_\_ \\ \_\_\_\_\_ \end{bmatrix}$$

22. Solve using Gauss-Jordan elimination.

$$2x_1 + 8x_2 - 10x_3 = 8$$
$$3x_1 + 12x_2 - 15x_3 = 12$$

Select the correct choice below and fill in the answer box(es) within your choice.

- **A.** The unique solution is $x_1 =$ _____, $x_2 =$ _____, and $x_3 =$ _____.
- **B.** The system has infinitely many solutions. The solution is $x_1 =$ _____, $x_2 =$ _____, and $x_3 = t$.
  (Simplify your answers. Do not factor. Type expressions using t as the variable.)
- **C.** The system has infinitely many solutions. The solution is $x_1 =$ _____, $x_2 = s$, and $x_3 = t$.
  (Simplify your answer. Do not factor. Type an expression using s and t as the variables.)
- **D.** There is no solution.

23. Find the product.

$$\begin{bmatrix} 1 & -1 & 1 \end{bmatrix} \begin{bmatrix} -3 \\ 8 \\ 3 \end{bmatrix}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** $\begin{bmatrix} 1 & -1 & 1 \end{bmatrix} \begin{bmatrix} -3 \\ 8 \\ 3 \end{bmatrix} =$ _____ (Simplify your answer.)
- **B.** The matrix product is not defined.

24. *Cost analysis*. A company with two different plants manufactures guitars and banjos. Its production costs for each instrument are given in the following matrices.

	Plant X		Plant Y	
	Guitar	Banjo	Guitar	Banjo
Materials	\$59	\$34	\$63	\$54
Labor	\$101	\$107	\$104	\$126

$= A$ $= B$

Find $\frac{1}{2}(A + B)$, the average cost of production for the two plants.

$\frac{1}{2}(A + B) = \begin{bmatrix} \$\_\_\_\_\_ & \$\_\_\_\_\_ \\ \$\_\_\_\_\_ & \$\_\_\_\_\_ \end{bmatrix}$

(Type integers or decimals.)

25. Examine the product of the two matrices to determine if each is the inverse of the other.

$$\begin{bmatrix} 1 & -1 & 1 \\ 0 & -1 & -1 \\ -4 & 9 & 0 \end{bmatrix} \begin{bmatrix} 9 & 9 & 2 \\ 4 & 4 & 1 \\ -4 & -5 & -1 \end{bmatrix}$$

Are the matrices inverses of each other?

- No
- Yes

26. Without performing any row operations, explain why the matrix does not have an inverse.

$$\begin{bmatrix} 6 & 35 \\ -2 & -16 \end{bmatrix}$$

Choose the correct reason below.

- **A.** The value of the determinant, D, is not 0.
- **B.** The value of the determinant, D, is 0.
- **C.** The matrix is not a square matrix.
- **D.** The matrix does not have a row or column of all zeros.

27. Find A^{-1} and A^2.

$$A = \begin{bmatrix} -72 \\ -247 \end{bmatrix}$$

Find A^{-1}.

$A^{-1} =$ _____ (Type an integer or decimal for each matrix element.)

Find A^2.

$A^2 =$ _____ (Type an integer or decimal for each matrix element.)

28. Find $(I - M)^{-1}$ and X.

$$M = \begin{bmatrix} 0.4 & 0.1 \\ 0.2 & 0.7 \end{bmatrix} \qquad D = \begin{bmatrix} 31 \\ 26 \end{bmatrix}$$

Select the correct choice below and fill in the answer box(es) within your choice.

○ **A.** $(I - M)^{-1} = \begin{bmatrix} \_\_\_\_\_ \\ \_\_\_\_\_ \end{bmatrix}$ (Type integers or decimals.)

○ **B.** The matrix $(I - M)$ is singular.

Select the correct choice below and fill in the answer box(es) within your choice.

○ **A.** $X = \begin{bmatrix} \_\_\_\_\_ \\ \_\_\_\_\_ \end{bmatrix}$ (Type integers or decimals.)

○ **B.** The matrix $(I - M)$ is singular, so X cannot be calculated.

29. Find $(I - M)^{-1}$ and X.

$$M = \begin{bmatrix} 0.8 & 0.5 \\ 0.2 & 0.5 \end{bmatrix}; \quad D = \begin{bmatrix} 35 \\ 55 \end{bmatrix}$$

Calculate $(I - M)^{-1}$. Select the correct choice below and fill in the answer box within your choice.

○ **A.** $(I - M)^{-1} = \begin{bmatrix} \_\_\_\_\_ \\ \_\_\_\_\_ \end{bmatrix}$

○ **B.** The matrix $(I - M)$ is singular.

Now calculate X. Select the correct choice below and fill in the answer box within your choice.

○ **A.** $X =$ _____

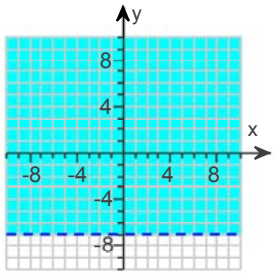
○ **B.** Since the matrix $(I - M)$ is singular, X cannot be calculated.

30. The economy of a small island nation is based on two sectors, coal and steel. Production of a dollar's worth of coal requires an input of \$0.40 from coal and \$0.41 from steel. Production of a dollar's worth of steel requires an input of \$0.35 from coal and \$0.24 from steel. Find the output from each sector that is needed to satisfy a final demand of \$25 million for coal and \$90 million for steel.

The output from the coal sector is approximately \$_____ million.
(Round to the nearest million.)

The output from the steel sector is approximately \$_____ million.
(Round to the nearest million.)

31. Write the inequality whose graph is given.



The inequality is _____.

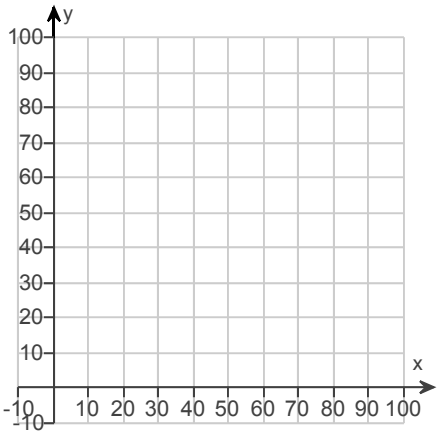
32. Define two variables and translate the sentence into an inequality.

Enrollment in finite mathematics plus enrollment in calculus is less than 500.

Let x be the number of students enrolled in finite mathematics and y be the number of students enrolled in calculus. Use x and y to write the inequality.

_____ (Type an inequality.)

33. Seed costs for a farmer are $75 per acre for corn and $60 per acre for soybeans. How many acres of each crop should the farmer plant if she wants to spend no more than $3000 on seed? Express your answer as a linear inequality with appropriate nonnegative restrictions and draw its graph.



Let x be the number of acres planted with corn and let y be the number of acres planted with soybeans. Choose the correct inequality below.

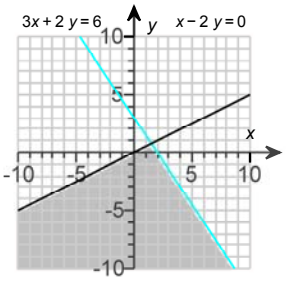
- **A.** $75x + 60y \le 3000,\ x \ge 0,\ y \ge 0$
- **B.** $75x + 60y \ge 3000,\ x \ge 0,\ y \ge 0$
- **C.** $75x + 60y > 3000,\ x \ge 0,\ y \ge 0$
- **D.** $75x + 60y < 3000,\ x \ge 0,\ y \ge 0$

Use the graphing tool to graph the inequality and the boundary lines representing the nonnegative constraints.

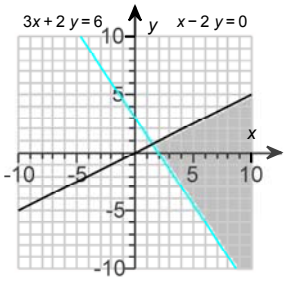
34. Choose the correct solution region of the following system of inequalities.

$$3x + 2y \geq 6$$
$$x - 2y \leq 0$$

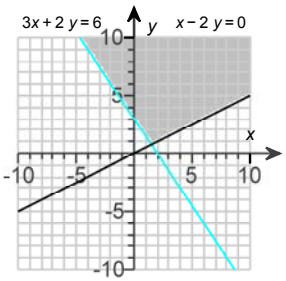
A.



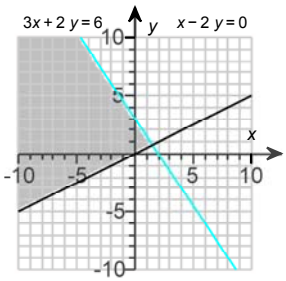
B.



C.

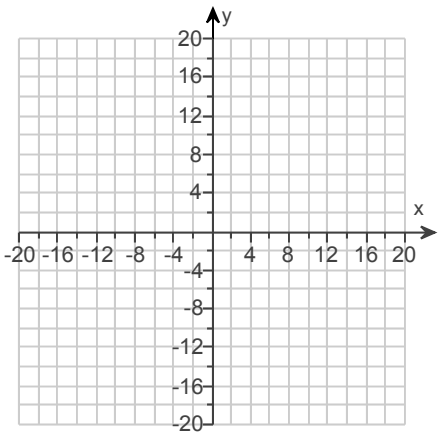


D.



35. Solve the system graphically, and indicate whether each solution region is bounded or unbounded. Find the coordinates of each corner point.

$2x + y \leq 18$ $x \geq 0$
$x + y \leq 10$ $y \geq 0$
$x + 2y \leq 18$



Use the graphing tool to graph the system of inequalities. Graph the region that represents the correct solution only once.

The solution region is (1) _____

What are the coordinates of each corner point?

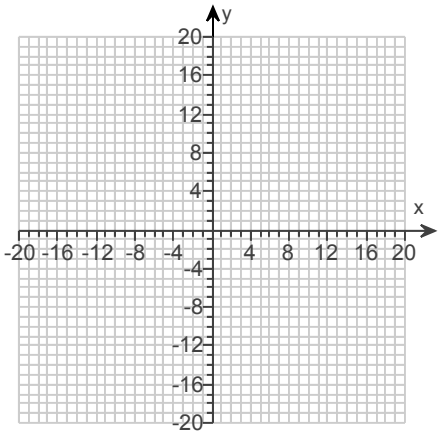
_____

(Type an ordered pair. Use a comma to separate answers as needed.)

(1) ○ bounded.
○ unbounded.

36. Solve the system graphically, and indicate whether each solution region is bounded or unbounded. Find the coordinates of each corner point.

$$\begin{aligned} -x + 5y &\geq 13 \\ 7x - y &\geq 11 \\ x + y &\leq 13 \\ x &\leq 7 \end{aligned}$$



Use the graphing tool to graph the system. Graph the region that represents the correct solution only once.

Is the solution region bounded or unbounded?

- Bounded
- Unbounded

What are the coordinates of each corner point?

_____

(Type an ordered pair. Use a comma to separate answers as needed.)

37. Solve the linear programming problem.

Maximize

$P = 3x + 3y$

Subject to $2x + y \leq 10$

$x + 2y \leq 8$

$x, y \geq 0$

Select the correct choice below and fill in any answer boxes present in your choice. What is the maximum value of P?

- **A.** P = _____
  (Type an integer or a fraction.)
- **B.** There is no maximum value of P.

Select the correct choice below and fill in any answer boxes present in your choice. What are the coordinates of the corner point where the maximum value of P occurs?

- **A.** The coordinates are _____.
  (Type an ordered pair.)
- **B.** There is no maximum value of P.

38. The corner points for the bounded feasible region determined by the system of inequalities shown below are O = (0,0), A = (0,4), B = (6,2), and C = (7,0).

$x + 3y \le 12$

$2x + y \le 14$

$x, y \ge 0$

If P = ax + by and a, b > 0, determine conditions on a and b that will ensure that the maximum value of P occurs at the following point(s).

(A) Only at A
(B) Only at B
(C) Only at C
(D) At both A and B
(E) At both B and C

(A) Which conditions on a and b will ensure that the maximum value of P occurs at A?

- **A.** $b = 2a$
- **B.** $\frac{b}{3} < a < 2b$
- **C.** $\frac{a}{3} < b < 2a$
- **D.** $a > 2b$
- **E.** $a = 2b$
- **F.** $b = \frac{a}{3}$
- **G.** $b < \frac{a}{3}$
- **H.** $a = \frac{b}{3}$
- **I.** $b > 2a$
- **J.** $a < \frac{b}{3}$

(B) Which conditions on a and b will ensure that the maximum value of P occurs at B?

- **A.** $a = 2b$
- **B.** $b > 2a$
- **C.** $a > 2b$
- **D.** $a < \frac{b}{3}$
- **E.** $b = 2a$
- **F.** $b = \frac{a}{3}$
- **G.** $b < \frac{a}{3}$
- **H.** $a = \frac{b}{3}$
- **I.** $\frac{b}{3} < a < 2b$
- **J.** $\frac{a}{3} < b < 2a$

(C) Which conditions on a and b will ensure that the maximum value of P occurs at C?

- **A.** $\frac{a}{3} < b < 2a$
- **B.** $\frac{b}{3} < a < 2b$
- **C.** $a = \frac{b}{3}$
- **D.** $b = \frac{a}{3}$
- **E.** $a < \frac{b}{3}$
- **F.** $b > 2a$
- **G.** $b < \frac{a}{3}$
- **H.** $a = 2b$
- **I.** $a > 2b$
- **J.** $b = 2a$

(D) Which conditions on a and b will ensure that the maximum value of P occurs at both A and B?

- **A.** $\frac{b}{3} < a < 2b$
- **B.** $a = 2b$
- **C.** $a > 2b$
- **D.** $a < \frac{b}{3}$
- **E.** $b = 2a$
- **F.**

G. $b = \frac{a}{3}$

H. $\frac{a}{3} < b < 2a$

I. $a = \frac{b}{3}$

J. $b > 2a$

(E) Which conditions on a and b will ensure that the maximum value of P occurs at both B and C?

A. $b > 2a$

B. $a = \frac{b}{3}$

C. $\frac{a}{3} < b < 2a$

D. $a = 2b$

E. $b < \frac{a}{3}$

F. $a > 2b$

G. $\frac{b}{3} < a < 2b$

H. $b = \frac{a}{3}$

I. $a < \frac{b}{3}$

J. $b = 2a$

39. A manufacturing company makes two types of water skis, a trick ski and a slalom ski. The relevant manufacturing data are given in the table.

Department	Labor-Hours per Ski		Maximum Labor-Hours Available per Day
	Trick Ski	Slalom Ski	
Fabricating	10	8	480
Finishing	1	1	50

Answer parts (A), (B), and (C) below.

(A) If the profit on a trick ski is $30 and the profit on a slalom ski is $40, how many of each type of ski should be manufactured each day to realize a maximum profit? What is the maximum profit?

The maximum profit is $_____. The maximum occurs when _____ trick skis and _____ slalom skis are produced.

(B) Discuss the effect on the production schedule and the maximum profit if the profit on a slalom ski decreases to $25.

The maximum profit (1) _____ $_____. The maximum occurs when _____ trick skis and _____ slalom skis are produced.

(C) Discuss the effect on the production schedule and the maximum profit if the profit on a slalom ski increases to $50.

The maximum profit (2) _____ $_____. The maximum occurs when _____ trick skis and _____ slalom skis are produced.

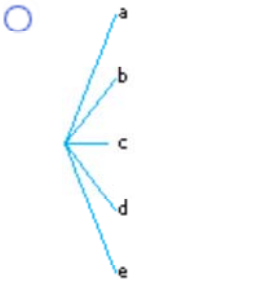
(1) decreases to / remains the same at / increases to

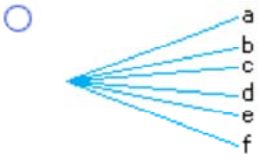
(2) increases to / remains the same at / decreases to

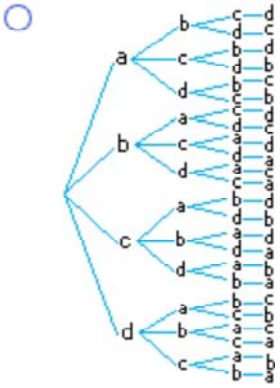
40. Solve the following problem two ways: **(a)** using a tree diagram and **(b)** using the multiplication principle.

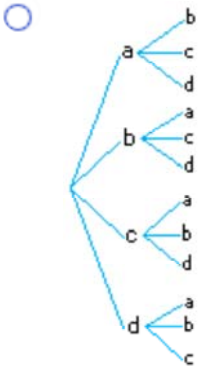
How many 4-letter code words can be formed from the first 4 letters of the alphabet if no letter can be used more than once?

a. Which tree diagram best describes the relationship above?







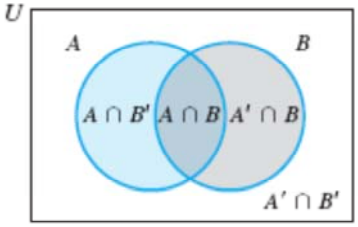


b. Using the multiplication principle what is the number of 4-letter words that can be formed?

_____

41. Use the given information to determine the number of elements in each of the four disjoint subsets in the following Venn diagram.

n(A) = 35,
n(B) = 50,
n(A ∪ B) = 65,
n(U) = 200



a. n(A ∩ B') = _____

b. n(A ∩ B) = _____

c. n(A' ∩ B) = _____

d. n(A' ∩ B') = _____

42. Determine the validity of the following statements.

(A) If A or B is the empty set, then A and B are disjoint.

Choose the correct answer below.

- **A.** The statement is false. For example, A could be the empty set and B could be the set of numbers less than 10.
- **B.** The statement is false. For example, A could be the set of odd numbers and B could be the set of even numbers.
- **C.** The statement is false. For example, A could be the set of odd numbers and B could be the set of prime numbers.
- **D.** The statement is true.

(B) If A and B are disjoint, then A or B is the empty set.

Choose the correct answer below.

- **A.** The statement is false. For example, A could be the set of odd numbers and B could be the set of even numbers.
- **B.** The statement is false. For example, A could be the empty set and B could be the set of numbers less than 10.
- **C.** The statement is true.
- **D.** The statement is false. For example, A could be the set of odd numbers and B could be the set of prime numbers.

43. How many different license plates are possible if each contains 4 letters (out of the alphabet's 26 letters) followed by 3 digits (from 0 to 9)?

There are _____ different possible license plates.
(Simplify your answer.)

44. Refer to the table from a graphing calculator to the right, which shows $y_1 = {}_nP_r$ and $y_2 = {}_nC_r$ for $n = 6$. Discuss and explain the symmetry of the numbers in the y_2 column of the table.

X	Y_1	Y_2
0	1	1
1	6	6
2	30	15
3	120	20
4	360	15
5	720	6
6	720	1

$Y_2 = 6\ {}_nC_r\ X$

Choose the correct answer below.

- **A.** The numbers are growing linearly.
- **B.** The numbers are the same read up or down, since ${}_nP_r = {}_nC_{n-r}$.
- **C.** The numbers are growing exponentially.
- **D.** The numbers are the same read up or down, since ${}_nC_r = {}_nC_{n-r}$.

45. Discuss the validity of each statement. If the statement is true, explain why. If not, give a counter example.

If n and r are positive integers and $1 < r < n$, then ${}_nC_r = {}_nC_{n-r}$.

Select the correct answer below and, if necessary, fill in the answer box to complete your choice.

- **A.** The statement is false, ${}_nC_r =$ _____.
- **B.** The statement is true because the values of ${}_nC_r$ in a table, for $r = 2, 3, \ldots n - 1$, are the same read up or down, so the value at r will have the same value at $n - r$.

46. Note from the table in the graphing calculator display below that the largest value of ${}_nC_r$ when $n = 26$ is ${}_{26}C_{13} = 10{,}400{,}600$. Use a similar table to find the largest value of ${}_nC_r$ when $n = 24$.

X	Y_1	
10	5311735	
11	7726160	
12	9657700	
13	10400600	
14	9657700	
15	7726160	
16	5311735	

$Y_1 = 26\ {}_nC_r\ X$

Complete a similar table of values for ${}_nC_r$ when $n = 24$.

X	Y_1	
9		
10		
11		
12		
13		
14		
15		

$Y_1 = 24\ {}_nC_r\ X$

What is the largest value of ${}_nC_r$ when $n = 24$?

_____

47. Without using a calculator, determine which event, E or F, is more likely to occur.

$P(E) = \frac{7}{8}$; $P(F) = \frac{3}{4}$

Select the correct answer below.

- **A.** Event E has the higher probability. Therefore, it is more likely to occur.
- **B.** Events E and F have equal probabilities. Therefore, the two events are equally likely to occur.
- **C.** Event F has the higher probability. Therefore, it is more likely to occur.
- **D.** There is not enough information given.

48. An experiment consists of drawing 1 card from a standard 52-card deck. What is the probability of drawing the 4 of diamonds?

The probability of drawing the 4 of diamonds is _____.
(Type an integer or a simplified fraction.)

49. An experiment consists of dealing 4 cards from a standard 52-card deck. What is the probability of being dealt exactly 2 face cards?

The probability of being dealt 2 face cards is _____.
(Round to six decimal places as needed.)

50. *Personnel selection.* Suppose that 7 female and 5 male applicants have been successfully screened for 5 positions. If the 5 positions are filled at random from the 12 finalists, what is the probability of selecting

(A) 3 females and 2 males?
(B) 4 females and 1 male?
(C) 5 females?
(D) At least 4 females?

(A) The probability of selecting 3 females and 2 males is approximately _____.
(Type a decimal. Round to three decimal places.)

(B) The probability of selecting 4 females and 1 male is approximately _____.
(Type a decimal. Round to three decimal places.)

(C) The probability of selecting 5 females is approximately _____.
(Type a decimal. Round to three decimal places.)

(D) The probability of selecting at least 4 females is approximately _____.
(Type a decimal. Round to three decimal places.)

51. Divide and simplify the result.

$$\frac{\frac{11}{6}}{\frac{11}{18}}$$

$$\frac{\frac{11}{6}}{\frac{11}{18}} = \_\_\_\_\_$$

52. Given the following probabilities for an event E, find the odds for and against E.

(A) $\frac{6}{7}$ (B) $\frac{7}{8}$ (C) 0.57 (D) 0.58

For all answers, type the odds as a fraction. Simplify your answers.

(A) Odds for = _____

Odds against = _____

(B) Odds for = _____

Odds against = _____

(C) Odds for = _____

Odds against = _____

(D) Odds for = _____

Odds against = _____

53. Discuss the validity of the following statement. If the statement is always true, explain why. If not, give a counterexample.

If $P(E) + P(F) = P(E \cup F) + P(E \cap F)$, then E and F are mutually exclusive events.

Choose the correct answer below.

- **A.** The statement is true because the sum of the probabilities of two mutually exclusive events is always equal to the sum of the probabilities of their union and their intersection.
- **B.** The statement is false because this equation only holds when P(E) is equal to P(F).
- **C.** The statement is true because $P(E \cup F)$ is equal to zero.
- **D.** The statement is false because if E and F are mutually exclusive events, $P(E \cup F)$ is equal to sum of P(E) and P(F).

54. What is the probability that a number selected at random from the first 1,000 positive integers is (exactly) divisible by 14 or 49?

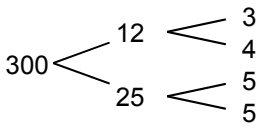
Probability = _____ (Type a decimal.)

55. Use a tree diagram to represent a factorization of the given integer into primes, so that there are two branches at each number that is not prime.

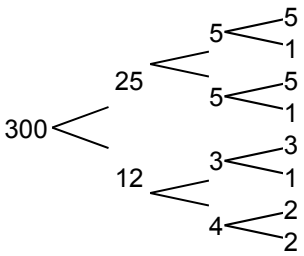
300

Choose the correct answer below.

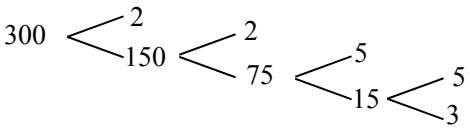
A.



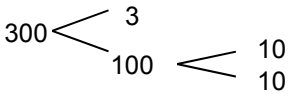
B.



C.



D.



56. Test the pair of events C and F for independence based on the following table.

	A	B	C	Total
D	0.23	0.01	0.06	0.30
E	0.36	0.17	0.07	0.60
F	0.01	0.02	0.07	0.10
Total	0.60	0.20	0.20	1.00

Are C and F independent or dependent and why? Select the correct answer below and fill in the answer boxes to complete your choice.

A. C and F are dependent because P(C∩F) does not equal P(C)P(F). P(C∩F) = _____ and P(C)P(F) = _____.

B. C and F are independent because P(C∩F) does not equal P(C)P(F). P(C∩F) = _____ and P(C)P(F) = _____.

C. C and F are dependent because P(C∩F) equals P(C)P(F). P(C∩F) = _____ and P(C)P(F) = _____.

D. C and F are independent because P(C∩F) equals P(C)P(F). P(C∩F) = _____ and P(C)P(F) = _____.

57. Two cards are drawn in succession from a standard 52-card deck. What is the probability that the first card is a spade and the second card is a heart

(A) If the cards are drawn without replacement?

(B) If the cards are drawn with replacement?

(A) What is the probability that the first card is a spade and the second card is a heart if the cards are drawn without replacement?

_____

(Type an integer or decimal rounded to four decimal places as needed.)

(B) What is the probability that the first card is a spade and the second card is a heart if the cards are drawn with replacement?

_____

(Type an integer or decimal rounded to four decimal places as needed.)

58. Two balls are drawn in succession out of a box containing 3 red and 4 white balls. Find the probability that at least 1 ball was red, given that the first ball was

(A) Replaced before the second draw.

(B) Not replaced before the second draw.

(A) Find the probability that at least 1 ball was red, given that the first ball was replaced before the second draw.

_____ (Simplify your answer. Type an integer or a fraction.)

(B) Find the probability that at least 1 ball was red, given that the first ball was not replaced before the second draw.

_____ (Simplify your answer. Type an integer or a fraction.)

59. Let $a_1, a_2, a_3, ..., a_n, ...$ be a geometric sequence. Find S_{10} and S_∞.

$a_1 = 700, r = 0.9$

$S_{10} =$ _____

(Type an integer or decimal rounded to two decimal places as needed.)

$S_\infty =$ _____

(Type an integer or decimal rounded to two decimal places as needed.)

60. Find $f(1) + f(2) + f(3) + ... + f(10)$ if $f(x) = \left(\frac{1}{2}\right)^x$.

$f(1) + f(2) + f(3) + ... + f(10) =$ _____

(Type an integer or decimal rounded to two decimal places as needed.)