

1. Find the interest rate needed for an investment of \$4,000 to grow to an amount of \$5,000 in 4 yr if interest is compounded continuously. Please round the answer to the nearest hundredth of percent.

- ☐ A) 5.58 %/yr
☐ B) 5.70 %/yr
☐ C) 6.63 %/yr
☐ D) 5.01 %/yr
☐ E) 5.92 %/yr

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2. Determine whether the system of linear equations has one and only one solution, infinitely many solutions, or no solution. Find all solutions whenever they exist.

$$x + 3y = 9$$

$$3x - y = 7$$

☐ A)

one and only one solution

(3, 2)

☐ B)

one and only one solution

(3, 4)

☐ C)

one and only one solution

(4, 2)

☐ D)

infinitely many solutions

$(9 - 3k, k)$

☐ E) no solution

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3. Write the following set in builder notation form

$\{7, 12, 17, 22, 27, 32, 37, 42, 47, 52\}$

- ☐ A) $\{x | x = 6n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ B) $\{x | x = 5n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ C) $\{x | x = 9n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ D) $\{x | x = 10n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ E) $\{x | x = 4n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$

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3. Write the following set in builder notation form

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- ☐ A) $\{x \mid x = 6n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ B) $\{x \mid x = 5n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ C) $\{x \mid x = 9n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ D) $\{x \mid x = 10n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$
- ☐ E) $\{x \mid x = 4n + 2; n, \text{ an integer between 1 and 10 inclusive}\}$

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4. Find the present value of \$40,000 due in 4 years at the given rate of interest 8%/year compounded monthly.
- ☐ A) The present value is \$28,948.67.
 - ☐ B) The present value is \$29,433.94.
 - ☐ C) The present value is \$29,076.82.
 - ☐ D) The present value is \$29,748.06.

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5. Let $S = \{1, 2, 3, 4, 5, 6\}$, $E = \{1, 3, 5\}$, $F = \{2, 4, 6\}$ and $G = \{2, 3\}$.

Are the events F and G mutually exclusive?

- ☐ A) yes
☐ B) no

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6. Indicate whether the matrix is in row-reduced form.

$$\left[\begin{array}{cc|c} 1 & 0 & -12 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{array} \right]$$

- ☐ A) The matrix is not in row-reduced form.
☐ B) The matrix is in row-reduced form.

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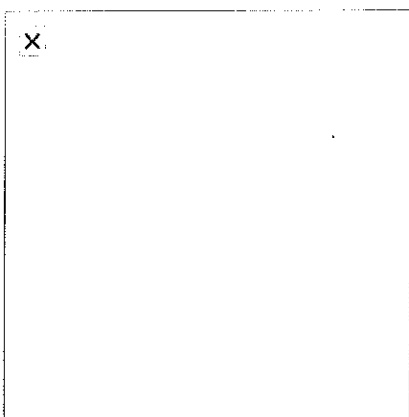
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7. Metro Department Store's annual sales (in millions of dollars) during 5 years were

Annual Sales, y	5.8	6.1	7.2	8.3	9
Year, x	1	2	3	4	5

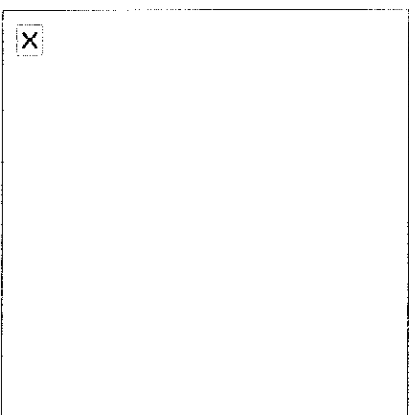
Plot the annual sales (y) versus the year (x) and draw a straight line L through the points corresponding to the first and fifth years and derive an equation of the line L.

☐ A)



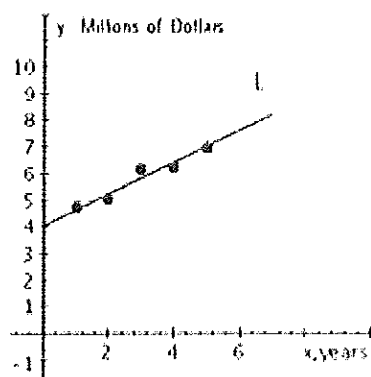
$$y = 0.9x + 1$$

☐ B)



$$y = 0.8x + 5$$

☐ C)



$$y = 0.6x + 4$$

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8. Find the simple interest on a \$400 investment made for 5 years at an interest rate of 7%/year. What is the accumulated amount?
- ☐ A) The simple interest is \$140, the accumulated amount is \$540.
 - ☐ B) The simple interest is \$115, the accumulated amount is \$515.
 - ☐ C) The simple interest is \$120, the accumulated amount is \$520.
 - ☐ D) The simple interest is \$125, the accumulated amount is \$555.

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9. A system composed of two linear equations must have at least one solution if the straight lines represented by these equations are nonparallel.
- ☐ A) false
 - ☐ B) true

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10. Determine whether the equation defines y as a linear function of x . If so, write it in the form $y = mx + b$. $8x = 5y + 9$

☐ A)

$$y = \frac{8}{5}x + \frac{9}{5}$$

☐ B)

$$y = \frac{8}{5}x - \frac{9}{5}$$

☐ C)

$$y = -\frac{8}{5}x - \frac{9}{5}$$

☐ D)

$$y = -\frac{8}{5}x + \frac{9}{5}$$

☐ E) y is not a linear function of x .

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11. The following breakdown of a total of 18,686 transportation fatalities that occurred in 2007 was obtained from records compiled by the U.S. Department of Transportation (DOT).

Mode of Transportation	Car	Train	Bicycle	Plane
Number of Fatalities	16,525	842	698	538

What is the probability that a victim randomly selected from this list of transportation fatalities for 2007 died in a train or a plane accident? Round answer to two decimal places.

- ☐ A) 0.05
☐ B) 0.11
☐ C) 0.07
☐ D) 0.08

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12. In a poll conducted among 180 active investors, it was found that 100 use discount brokers, 122 use full-service brokers, and 54 use both discount and full-service brokers. How many investors use only discount brokers?

- ☐ A) 68
- ☐ B) 58
- ☐ C) 46
- ☐ D) 36
- ☐ E) 56

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13. Write the equation $5x - 6y - 12 = 0$ in the slope-intercept form and then find the slope and y-intercept of the corresponding line.

☐ A) $y = \frac{5}{6}x - 2$, $m = \frac{5}{6}$, $b = -2$

☐ B) $y = -\frac{5}{12}x + 4$, $m = -\frac{5}{12}$, $b = 4$

☐ C) $y = \frac{6}{5}x - 4$, $m = \frac{6}{5}$, $b = -4$

☐ D) $y = \frac{5}{7}x - 2$, $m = \frac{5}{7}$, $b = -2$

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14. Find the pivot element to be used in the next iteration of the simplex method.

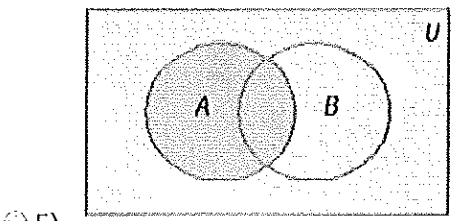
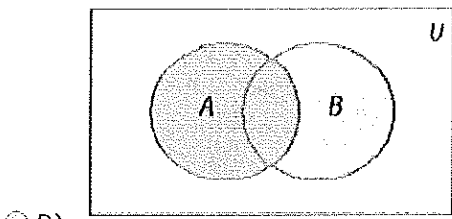
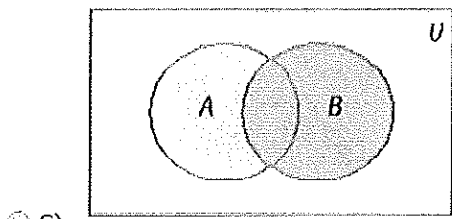
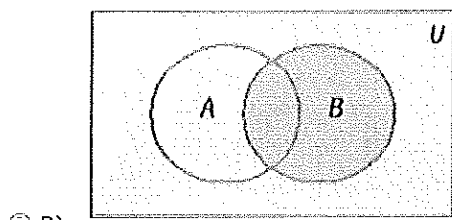
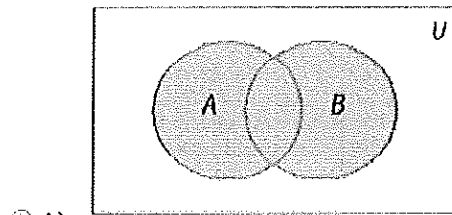
x	y	z	s	t	u	v	P	Constant
$\frac{5}{2}$	3	0	1	0	0	-4	0	46
1	0	0	0	1	0	0	0	9
0	2	0	0	0	1	0	0	12
0	0	1	0	0	0	1	0	6
-180	-200	0	1	0	0	300	1	1800

- ☐ A) Pivot element is 3, lying in first row, second column.
☐ B) Pivot element is 0, lying in second row, second column.
☐ C) Pivot element is 2, lying in third row, second column.
☐ D) Pivot element is $\frac{5}{2}$, lying in first row, first column.
☐ E) Pivot element is 1, lying in fourth row, second column.

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15. Use Venn diagrams to illustrate the statement.

$$A \subset A \cup B$$



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16. Solve the linear system of equations

$$x - 3y = -6$$

$$5x + 3y = 42$$

☐ A)

Unique solution:

$(6, 4)$

☐ B)

Unique solution:

$(6, -1)$

☐ C)

Infinitely many solutions:

$(t, 8t + 7)$

☐ D) No solution

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17. Maximize

$$P = 10x + 12y$$

subject to

$$x + 3y \leq 12$$

$$3x + 2y \leq 22$$

- ☐ A) $x = 5, y = 2, u = 0, v = 2, P = 74$
- ☐ B) $x = 6, y = 2, u = 0, v = 0, P = 84$
- ☐ C) $x = 7, y = 2, u = 0, v = 1, P = 94$
- ☐ D) $x = 7, y = 2, u = 0, v = 1, P = 94$
- ☐ E) $x = 2, y = 6, u = 0, v = 0, P = 92$

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18. Solve the linear programming problem by the simplex method.

$$\text{Maximize} \quad P = 3x + 4y$$

$$\begin{aligned} \text{subject to} \quad & x + y \leq 4 \\ & 2x + y \leq 6 \\ & x \geq 0, y \geq 0 \end{aligned}$$

- ☐ A) $x = 4; y = 0; u = 0; v = 1; P = 16$
- ☐ B) $x = 4; y = 0; u = 1; v = 0; P = 16$
- ☐ C) $x = 0; y = 4; u = 1; v = 0; P = -16$
- ☐ D) $x = 0; y = 4; u = 1; v = 0; P = 16$
- ☐ E) $x = 0; y = 4; u = 0; v = 2; P = 16$

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19. If the line passing through the points $(2, a)$ and $(5, -3)$ is parallel to the line passing through the points $(4, 8)$ and $(-5, a + 1)$, what is the value of a ?

☐ A) $a = -8$

☐ B) $a = 4$

☐ C) $a = -4$

☐ D) $a = 8$

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20. A survey of 900 subscribers to the Los Angeles Times revealed that 700 people subscribe to the daily morning edition and 400 subscribe to both the daily and the Sunday editions. How many subscribe to the Sunday edition?

- ☐ A) 500 people
- ☐ B) 700 people
- ☐ C) 600 people
- ☐ D) 300 people
- ☐ E) 900 people
- ☐ F) 100 people

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21. An experiment consists of tossing a coin, rolling a die, and observing the outcomes. Describe the event "A head is tossed and an odd number is rolled."

- ☐ A) $\{(H, 2), (H, 4), (H, 6)\}$
- ☐ B) $\{(H, 1), (H, 3), (H, 5)\}$
- ☐ C) $\{(1, 3, 5), (H, H, H)\}$
- ☐ D) $\{(1, 3, 5), (H)\}$

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22. Solve the system of linear equations using the Gauss-Jordan elimination method.

$$3x + 2y = 14$$

$$x - 4y = -14$$

- ☐ A) $(2, -14)$
- ☐ B) $(4, -14)$
- ☐ C) $(2, 4)$
- ☐ D) $(2, 16)$
- ☐ E) $(4, -14)$

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23. Check that the given simplex tableau is in final form. Find the solution to the associated regular linear programming problem.

x	y	u	v	P	Constant
0	1	$\frac{5}{7}$	$-\frac{1}{7}$	0	$\frac{16}{7}$
1	0	$-\frac{3}{7}$	$\frac{2}{7}$	0	$\frac{30}{7}$
0	0	$\frac{13}{7}$	$\frac{3}{7}$	1	$\frac{220}{7}$

- ☐ A) $x = \frac{30}{7}, y = \frac{16}{7}, u = \frac{30}{7}, v = \frac{16}{7}, P = \frac{220}{7}$
☐ B) $x = \frac{16}{7}, y = \frac{30}{7}, u = \frac{16}{7}, v = \frac{30}{7}, P = \frac{220}{7}$
☐ C) $x = \frac{30}{7}, y = \frac{16}{7}, u = 0, v = 0, P = \frac{220}{7}$
☐ D) $x = \frac{16}{7}, y = \frac{30}{7}, u = 0, v = 0, P = \frac{220}{7}$

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24. What is the probability of arriving at a traffic light when it is red if the red signal is flashed for 30 sec, the yellow signal for 5 sec, and the green signal for 40 sec?

- ☐ A) The probability is 0.35
- ☐ B) The probability is 0.40
- ☐ C) The probability is 0.50
- ☐ D) The probability is 0.45

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25. If a merchant deposits \$1,500 annually at the end of each tax year in an IRA account paying interest at the rate of 10%/year compounded annually, how much will she have in her account at the end of 25 years? Round your answer to two decimal places.

- ☐ A) \$16,252.06
- ☐ B) \$147,520.59
- ☐ C) \$5,250.00
- ☐ D) \$34,663.65

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