Q1. A retired couple has $190,000 to invest to obtain annual income. They want some of it invested in safe Certificates of Deposit yielding 7%. The rest they want to invest in AA bonds yielding 10% per year. How much should they invest in each to realize exactly $17,200 per year?

a. $120,000 at 7% and $70,000 at 10%

b. $130,000 at 7% and $60,000 at 10%

c. $130,000 at 10% and $60,000 at 7%

d. $140,000 at 10% and $50,000 at 7%

Q2. Solve the system using the inverse method.

$$\begin{cases} 2x + 6y = 2 \\ 2x - y = -5 \end{cases}$$

a. x = 1, y = -2

b. x = -2, y = 1

c. x = -1, y = 2

d. x = 2, y = -1

Q3. Verify that the values of the variables listed are solutions of the system of equations.

$$\begin{cases} x + y = 0 \\ x - y = -10 \end{cases}$$
x = 5, y = 5

a. not a solution

b. solution

Q4. A movie theater charges $8.00 for adults and $5.00 for children. If there were 40 people altogether and the theater collected $272.00 at the end of the day, how many of them were adults?

a. 16 adults

b. 10 adults

c. 29 adults

d. 24 adults

Q5. Solve the system of equations.

$$\begin{cases} x - y + 2z = -1 \\ 2x + z = 0 \\ x + 5y + z = 5 \end{cases}$$

a. x = 0, y = 1, z = 0

b. x = 1, y = 1, z = 1

c. x = 0, y = 1, z = -1

○ d. x = 0, y = 0, z = 1

Q6. Solve the system.

$$\begin{cases} x + 2y = -9 \\ 5x + 10y = -45 \end{cases}$$

○ a. inconsistent (no solution)

○ b. (-9, 0)

○ c. (0, 0)

○ d. y = - $\dfrac{x}{2}$ - 9, where x is any real number

Q7. Use the elimination method to solve the system.

$$\begin{cases} 2x + 10y = -72 \\ 11x + 2y = 81 \end{cases}$$

○ a. x = 11, y = -11

○ b. x = -2, y = 9

○ c. x = 9, y = -9

○ d. x = -9, y = 9

Q8. Find the inverse of the matrix.

$$A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

○ a. $\begin{bmatrix} -1 & 0 & 0 \\ -1 & -1 & 0 \\ -1 & -1 & -1 \end{bmatrix}$

○ b. $\begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix}$

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

○ d. $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

Q9. A flat rectangular piece of aluminum has a perimeter of 62 inches. The length is 15 inches longer than the width. Find the width.

○ a. 31 inches

○ b. 38 inches

○ c. 8 inches

○ d. 23 inches

Q10. Jenny receives $1270 per year from three different investments totaling $20,000. One of the investments pays 6% , the second one pays 8%, and the third one pays 5%. If the money invested at 8% is $1500 less than the amount invested at 5%, how much money has Jenny invested in the investment that pays 6%?

○ a. $8500

○ b. $4500

○ c. $10,000

○ d. $1500

Q11. Perform the indicated operations and simplify.

Let A = $\begin{bmatrix} 3 & -4 \\ -2 & 5 \end{bmatrix}$, B = $\begin{bmatrix} 5 & -2 & 8 \\ 1 & 0 & -3 \end{bmatrix}$, and C = $\begin{bmatrix} 7 & -9 & 0 \\ 3 & -5 & 1 \\ -1 & 6 & 2 \end{bmatrix}$. Find AB + BC.

○ a. $\begin{bmatrix} 32 & 19 & 40 \\ -15 & 31 & -37 \end{bmatrix}$

○ b. $\begin{bmatrix} 68 & 3 & 31 \\ 8 & -2 & -5 \end{bmatrix}$

○ c. $\begin{bmatrix} -10 & -19 & 12 \\ -15 & 31 & -25 \end{bmatrix}$

○ d. $\begin{bmatrix} 32 & 7 & 50 \\ 5 & -23 & -37 \end{bmatrix}$

Q12. Perform the indicated operation, whenever possible.

$\begin{bmatrix} -4 & -1 \\ 8 & -5 \\ -8 & -5 \end{bmatrix} + \begin{bmatrix} -8 & 7 \\ 6 & -6 \\ 1 & -1 \end{bmatrix}$

○ a. $\begin{bmatrix} -12 & 6 \\ 14 & -11 \\ -7 & -6 \end{bmatrix}$

○ b. $\begin{bmatrix} -12 & -5 \\ 14 & -11 \\ -7 & -6 \end{bmatrix}$

○ c. $\begin{bmatrix} -12 & 6 \\ -14 & -5 \\ -7 & 6 \end{bmatrix}$

○ d. $\begin{bmatrix} 4 & -8 \\ 2 & 1 \\ -9 & 4 \end{bmatrix}$

Q13. Use the properties of determinants to find the value of the second determinant, given the value of the first.

Given $\begin{vmatrix} s & t & u \\ v & w & x \\ 4 & 2 & 8 \end{vmatrix}$ = 3, find the value of $\begin{vmatrix} 32-s & 16-t & 64-u \\ v & w & x \\ 4 & 2 & 8 \end{vmatrix}$.

○ a. -24

○ b. -3

○ c. 24

○ d. 3

Q14. A tour group split into two groups when waiting in line for food at a fast food counter. The first group bought 8 slices of pizza and 4 soft drinks for $29.40. The second group bought 7 slices of pizza and 6 soft drinks for $30.30. How much does one slice of pizza cost?

○ a. $2.26 per slice of pizza

○ b. $2.76 per slice of pizza

○ c. $2.33 per slice of pizza

○ d. $1.83 per slice of pizza

Q15. Rob bought 2 pairs of shorts, 3 shirts and a pair of shoes for $146.64. Jessie bought 3 pairs of shorts, 5 shirts and 2 pairs of shoes for $256.35. Allen bought a pair of shorts and 4 shirts for $104.07. What is the price of a pair of shorts? Express answer rounded to two decimal places.

○ a. $14.55

○ b. $50.40

○ c. $22.38

○ d. $10.30

Q16. Solve the system using the inverse method.

$$\begin{cases} x + 2y + 3z = 2 \\ x + y + z = -12 \\ 2x + 2y + z = 10 \end{cases}$$

○ a. x = -36, y = -38, z = -14

○ b. x = -14, y = 88, z = -32

○ c. x = -60, y = 82, z = -34

○ d. x = 8, y = 24, z = 10

Q17. Write the partial fraction decomposition of the rational expression.

$$\frac{13x + 2}{(x - 1)(x^2 + x + 1)}$$

○ a. $\dfrac{5}{x - 1} + \dfrac{-5x + 3}{x^2 + x + 1}$

○ b. $\dfrac{5}{x-1} + \dfrac{3x-5}{x^2+x+1}$

○ c. $\dfrac{-5}{x-1} + \dfrac{5x+3}{x^2+x+1}$

○ d. $\dfrac{5}{x-1} + \dfrac{-5}{x+1} + \dfrac{3}{x-1}$

Q18. An 8-cylinder Crown Victoria gives 18 miles per gallon in city driving and 21 miles per gallon in highway driving. A 300-mile trip required 15.5 gallons of gasoline. How many whole miles were driven in the city?

○ a. 153 miles

○ b. 168 miles

○ c. 147 miles

○ d. 132 miles

Q19. Write the partial fraction decomposition of the rational expression.

$\dfrac{3x^3 + 2x^2}{(x^2+5)^2}$

○ a. $\dfrac{3x+2}{x^2+5} + \dfrac{15x+10}{(x^2+5)^2}$

○ b. $\dfrac{3x+2}{x^2+5} + \dfrac{15x-10}{(x^2+5)^2}$

○ c. $\dfrac{3x+2}{x^2+5} + \dfrac{-15x-10}{(x^2+5)^2}$

○ d. $\dfrac{3x-2}{x^2+5} + \dfrac{-15x+10}{(x^2+5)^2}$

Q20. The Family Fine Arts Center charges \$21 per adult and \$12 per senior citizen for its performances. On a recent weekend evening when 486 people paid admission, the total receipts were \$6894. How many who paid were senior citizens?

○ a. 208 senior citizens

○ b. 368 senior citizens

○ c. 118 senior citizens

○ d. 278 senior citizens