

- 1) Find the least common multiple of the two largest elements in the matrix that results when [A] and [B] are multiplied.

$$[A] = \begin{bmatrix} 5 & 9 & 1 \\ 1 & 4 & 2 \\ 4 & 0 & 1 \end{bmatrix} \quad [B] = \begin{bmatrix} 7 \\ 5 \\ 4 \end{bmatrix}$$

- 2) Given the parabola $(y + 3) = 4(x - 2)^2$ with a minimum value of "A", axis of symmetry $x = B$, y-intercept at $(0, C)$, and roots at $(D, 0)$ and $(E, 0)$;

Find $A + B + C + D + E$.

- 3) Solve the following systems of equations and evaluate $a + b + c$

$$\begin{aligned} 3c + 2a &= 9 \\ 3a + 2b &= 8 \\ -2a + 3c &= 21 \end{aligned}$$

- 4) Find $A - B$ given the following:

$$\begin{aligned} A &= \text{the maximum value of } 5 + 2x - 2x^2 \\ B &= \text{the minimum value of } x^2 + 5x - 3 \end{aligned}$$

- 5) Solve for x given the following:

$$\begin{aligned} z + 6 &= 3(y + 2) \\ 8(y + z) &= 70 - z \\ \log_p x &= z \end{aligned}$$

- 6) Find $A + B + C + D$ given the following:

$$\begin{aligned} A &= \text{the sum of the first 10 positive odd integers.} \\ B &= \text{the sum of all elements in a } 3 \text{ by } 3 \text{ identity matrix.} \\ C &= \text{The } y\text{-coordinate of the intersection of the lines } 2x + 2y = 1 \text{ and } 4x - 3y = 2. \\ D &= \text{the } x\text{-coordinate of the vertex of the function given by } x = y^2 + 2y - 3. \end{aligned}$$

- 7) Find $A + B + C + D$ given the following:

$$\begin{aligned} A &= \text{The } 112^{\text{th}} \text{ term in an arithmetic series with a first term of 6 and a common difference of 3.} \\ B &= \text{The first term in a geometric series in which the } 14^{\text{th}} \text{ term has a value of 8192 and the common ratio is 2.} \\ C &= \text{The sum of the first 26 terms in an arithmetic series with a first term of 16 and a } 26^{\text{th}} \text{ term of 21.} \\ D &= \text{The common ratio of a geometric series in which the sum of the first 4 terms is 16.875 and the first term is 9.} \end{aligned}$$

8) Find $|A + B|$ given that $f(x) = x^2 + 2x + 3$ and has roots at $x = A$ and $x = B$.

9) Find x if given the following expression:

$$\begin{bmatrix} \log x & 3 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} -2 \\ -1 \end{bmatrix} = \begin{bmatrix} -7 \\ -5 \end{bmatrix}$$

10) If $2x^3 + 6x^2 - 6x - 10$ can be factored into $A(Bx + C)(Dx^E + Fx^G + Hx^J)$, and A, B, C, \dots are integers, and $A > 0$, and $B > 0$, find $A + B + \dots + H + J$. If the expression cannot be factored as shown, write "Not possible" as your answer.

11) Find the sum of all the elements in the resulting matrix when the given matrix is multiplied by its own transposition.

$$\begin{bmatrix} 4 & 6 \\ 1 & 9 \end{bmatrix}$$

12) Represent $(1001001010)_{\text{base } 2}$ in decimal (base 10).

13) Select the letter of the response which accurately describes the nature of the roots of $y = 4x^2 + 8x + 20$. (Write the letter as your answer, i.e. A, B, C, D, E, or F)

- A – Two real roots
- B – One real root and one imaginary root
- C – Two imaginary roots
- D – One real root and two imaginary roots
- E – Two real roots and two imaginary roots
- F – This equation has no roots

14) Given that "q" varies inversely with "j", and that $j = 15$ when $q = 2$, find "q" when $j = 10$.

15) Find the equation for the axis-of-symmetry of the conic section formed by the equation $x = y^2 + 3y - 2$