warm up

Which of the following is the inverse of the matrix $\begin{pmatrix} 4 & -3 \\ 2 & -2 \end{pmatrix}$?

[A] $\begin{pmatrix} -1 & \frac{3}{2} \\ -1 & 2 \end{pmatrix}$ [B] $\begin{pmatrix} 2 & -1 \\ \frac{3}{2} & -1 \end{pmatrix}$ [C] $\begin{pmatrix} 1 & -\frac{3}{2} \\ 1 & -2 \end{pmatrix}$ [D] $\begin{pmatrix} \frac{1}{7} & -\frac{3}{14} \\ \frac{1}{7} & -\frac{2}{7} \end{pmatrix}$

$y = mx + b$

Which system of equations would you use to represent the cost of these two newspaper classified rates?

$C = 0.2w + 18$
$C = 0.1w + 25$

- The "Daily Gleaner" has a flat rate of $18 plus 20¢ per word
- The "Times-Transcript" has a flat rate of $25 plus 10¢ per word

(A) $C - 18 = 20w$, $C - 25 = 10w$ (B) $18 + C = 20w$, $25 + C = 10w$ (C) $C = 02w + 18$, $C = 01w + 25$ (D) $C - 18w = 0.2$, $C - 25w = 01$

① $\begin{bmatrix} 4 & -3 \\ 2 & -2 \end{bmatrix}$

① Det $= ad - bc$
$= (4)(-2) - (-3)(2)$
$= -8 - (-6)$
$= -2$

② New Matrix: $\begin{bmatrix} -2 & 3 \\ -2 & 4 \end{bmatrix}$

③ Inverse $= \frac{1}{\text{Det}} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

Inverse $= -\frac{1}{2} \begin{bmatrix} -2 & 3 \\ -2 & 4 \end{bmatrix}$

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[A]^-1
        [[1   -1.5]
         [1   -2  ]]
Ans▸Frac
        [[1   -3/2]
         [1   -2  ]]
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Inverse $= \begin{bmatrix} 1 & -\frac{3}{2} \\ 1 & -2 \end{bmatrix}$

BONUS!!

Determine a, b, and c so that the points (-1 , 5), (2 , -1), and (3 , 13) are on the graph of $f(x) = ax^2 + bx + c$.

x , y

$y = ax^2 + bx + c$

(-1, 5)

$y = ax^2 + bx + c$

$5 = a(-1)^2 + b(-1) + c$

$5 = a - b + c$

$a - b + c = 5$

(2, -1)

$y = ax^2 + bx + c$

$-1 = a(2)^2 + b(2) + c$

$-1 = 4a + 2b + c$

$4a + 2b + c = -1$

(3, 13)

$y = ax^2 + bx + c$

$13 = a(3)^2 + b(3) +$

$13 = 9a + 3b + c$

$9a + 3b + c = 13$

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & 5 \\ 4 & 2 & 1 & -1 \\ 9 & 3 & 1 & 13 \end{array}\right] \rightarrow$$

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rref([A]
     [[1  0  0  4 ]
      [0  1  0  -6]
      [0  0  1  -5]]
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$a = 4$

$b = -6$

$c = -5$

Questions from Homework

⑤ b) $2x-3y+z=-9$
$2x-4y+3z=-16$
$4x+y-3z=13$

$$\left[\begin{array}{ccc|c} 2 & -3 & 1 & -9 \\ 2 & -4 & 3 & -16 \\ 4 & 1 & -3 & 13 \end{array}\right] \begin{array}{l} R2-R1 \\ R3-2R1 \end{array} \left[\begin{array}{ccc|c} 2 & -3 & 1 & -9 \\ 0 & -1 & 2 & -7 \\ 0 & 7 & -5 & 31 \end{array}\right] R3+7R2 \left[\begin{array}{ccc|c} 2 & -3 & 1 & -9 \\ 0 & -1 & 2 & -7 \\ 0 & 0 & 9 & -18 \end{array}\right]$$

$9z=-18$
$z=-2$

$-y+2z=-7$
$-y+2(-2)=-7$
$-y-4=-7$
$-y=-3$
$y=3$

$2x-3y+z=-9$
$2x-3(3)+(-2)=-9$
$2x-9-2=-9$
$2x=2$
$x=1$

$(1,-2,3)$

④ b) $\left[\begin{array}{cc|cc} 12 & 10 & 1 & 0 \\ 7 & 6 & 0 & 1 \end{array}\right] \begin{array}{l} 3R1-5R2 \\ 12R2-7R1 \end{array}$

$$\left[\begin{array}{cc|cc} 1 & 0 & 3 & -5 \\ 0 & 2 & -7 & 12 \end{array}\right] R2 \div 2$$

$$\left[\begin{array}{cc|cc} 1 & 0 & 3 & -5 \\ 0 & 1 & -7/2 & 6 \end{array}\right] \leftarrow \text{Inverse}$$

Questions from Homework

⑤ c) $3x-2y+5z=1$

$4x+5y-3z=17$

$7x-3y+2z=36$

$$\left[\begin{array}{ccc|c} 3 & -2 & 5 & 1 \\ 4 & 5 & -3 & 17 \\ 7 & -3 & 2 & 36 \end{array}\right] \xrightarrow{\substack{3R_2-4R_1 \\ 3R_3-7R_1}} \left[\begin{array}{ccc|c} 3 & -2 & 5 & 1 \\ 0 & 23 & -29 & 47 \\ 0 & 5 & -29 & 101 \end{array}\right] \xrightarrow{23R_3-5R_2} \left[\begin{array}{ccc|c} 3 & -2 & 5 & 17 \\ 0 & 23 & -29 & 47 \\ 0 & 0 & -522 & 2088 \end{array}\right]$$

$-522z=2088$

$z=-4$

$23y-29z=47$

$23y-29(-4)=47$

$23y+116=47$

$23y=-69$

$y=-3$

$3x-2y+5z=1$

$3x-2(-3)+5(-4)=1$

$3x+6-20=1$

$3x-14=1$

$3x=15$

$x=5$

$(5,-3,-4)$

Review Sheet

① $\begin{bmatrix} 2x+y & 5 \\ -1 & y-x \end{bmatrix} = \begin{bmatrix} -2 & 5 \\ -1 & 1 \end{bmatrix}$

$2x+y=-2$
$y-x=1$

$\xrightarrow{(-)}$ $2x+y=-2$
$-x+y=1$
$3x=-3$
$x=-1$

$2x+y=-2$
$2(-1)+y=-2$
$-2+y=-2$
$y=0$