# 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] $\begin{pmatrix} \frac{1}{7} & -\frac{3}{14} \\ \frac{1}{7} & -\frac{2}{7} \end{pmatrix}$

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

- 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) $\begin{matrix} C-18=20w \\ C-25=10w \end{matrix}$ (B) $\begin{matrix} 18+C=20w \\ 25+C=10w \end{matrix}$ (C) $\begin{matrix} C=0.2w+18 \\ C=0.1w+25 \end{matrix}$ (D) $\begin{matrix} C-18w=0.2 \\ C-25w=0.1 \end{matrix}$

# Questions from Homework

④a) $R1 + 4R2$, $2R1 + 9R3$

$$\left[\begin{array}{cc|cc} 9 & -4 & 1 & 0 \\ -2 & 1 & 0 & 1 \end{array}\right]$$

$$\left[\begin{array}{cc|cc} 1 & 0 & 1 & 4 \\ 0 & 1 & 2 & 9 \end{array}\right]$$ ← Inverse

⑤ c) $3x - 2y + 5z = 1$

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

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

$$\left[\begin{array}{ccc|c} 3 & -2 & 5 & 1 \\ 4 & 5 & -3 & 17 \\ 7 & -3 & 2 & 36 \end{array}\right] \begin{array}{l} \\ 3R2 - 4R1 \\ 3R3 - 7R1 \end{array} \left[\begin{array}{ccc|c} 3 & -2 & 5 & 1 \\ 0 & 23 & -29 & 47 \\ 0 & 5 & -29 & 101 \end{array}\right] 23R3 - 5R2 \left[\begin{array}{ccc|c} 3 & -2 & 5 & 1 \\ 0 & 23 & -29 & 47 \\ 0 & 0 & -522 & 2088 \end{array}\right]$$

$-522z = 2088$

$z = -4$

$23y - 29z = 47$

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

$23y + 116 = 47$

$23y = -69$

$y = -3$

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

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

$3x + 6 - 20 = 1$

$3x - 14 = 1$

$3x = 15$

$x = 5$

$(5, -3, -4)$

## BONUS!!

x, y

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

$y = ax^2 + bx + c$

(-1, 5)

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

$5 = a - b + c$

$a - b + c = 5$

(2, -1)

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

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

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

(3, 13)

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

$13 = 9a + 3b + c$

$9a + 3b + c = 13$

$a - b + c = 5$
$4a + 2b + c = -1$
$9a + 3b + c = 13$

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & 5 \\ 4 & 2 & 1 & -1 \\ 9 & 3 & 1 & 13 \end{array}\right] \rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & -6 \\ 0 & 0 & 1 & -5 \end{array}\right]$$

$a = 4$
$b = -6$
$c = -5$

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

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

$$\begin{array}{r} 2x+y=-2 \\ -x+y=1 \\ \hline 3x=-3 \end{array}$$

$x=-1$

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

④ a) $2x+3y+7z=15$
$5x+4y-4z=-2$
$-2x+y+2z=-1$

$10x+15y+35z=75$
$\leftarrow 10x+8y-8z=-4$
$7y+43z=79$

$10x+8y-8z=-4$
$+(-10x+5y+10z=-5)$
$13y+2z=-9$

$91y+559z=1087$
$\leftarrow 91y+14z=-63$
$545z=1090$
$z=2$

$13y+2z=-9$
$13y+2(2)=9$
$13y+4=-9$
$13y=-13$
$y=-1$

$2x+3y+7z=15$
$2x+3(-1)+7(2)=15$
$2x-3+14=15$
$2x+11=15$
$2x=4$
$x=2$

$(2,-1,2)$

④ a) $2x+3y+7z=15$
$5x+4y-4z=-2$
$-2x+y+2z=-1$

$$\left[\begin{array}{ccc|c} 2 & 3 & 7 & 15 \\ 5 & 4 & -4 & -2 \\ -2 & 1 & 2 & -1 \end{array}\right]$$

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rref([A]
     [[1 0 0 2 ]
      [0 1 0 -1]
      [0 0 1 2 ]]
■
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$(2,-1,2)$

⑤ a) $3x-4y+5z=26$

$6x-2y-3z=-39$

$x+3y-4z=-31$

$$\left[\begin{array}{ccc|c} 3 & -4 & 5 & 26 \\ 6 & -2 & -3 & -39 \\ 1 & 3 & -4 & -31 \end{array}\right] \xrightarrow{2R1-R2,\ 3R3-R1} \left[\begin{array}{ccc|c} 3 & -4 & 5 & 26 \\ 0 & -6 & 13 & 91 \\ 0 & 13 & -17 & -119 \end{array}\right] \xrightarrow{13R2+6R3} \left[\begin{array}{ccc|c} 3 & -4 & 5 & 26 \\ 0 & -6 & 13 & 91 \\ 0 & 0 & 67 & 469 \end{array}\right]$$

$67z=469$

$z=7$

$-6y+13z=91$

$-6y+13(7)=91$

$-6y+91=91$

$-6y=0$

$y=0$

$3x-4y+5z=26$

$3x-4(0)+5(7)=26$

$3x+35=26$

$3x=-9$

$x=3$

$(-3,0,7)$

⑤ a) $3x-4y+5z=26$

$6x-2y-3z=-39$

$x+3y-4z=-31$

$$\left[\begin{array}{ccc|c} 3 & -4 & 5 & 26 \\ 6 & -2 & -3 & -39 \\ 1 & 3 & -4 & -31 \end{array}\right]$$

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rref([B]
    [[1 0 0 -3]
     [0 1 0 0 ]
     [0 0 1 7 ]]
■
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$(-3,0,7)$