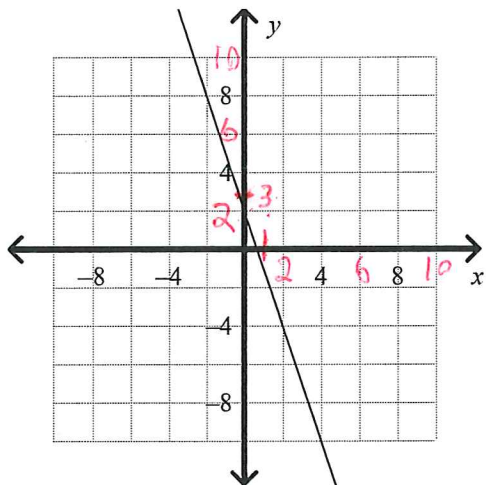## 2016 Algebra 2A Midterm Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

What is an equation of the line in slope intercept form?

(handwritten annotations)

Check

$y = mx + b$

#1 I will give slope and intercept, if similar problem.

slope y-intercept, Going down

$\text{Slope} = \dfrac{Rise}{Run} = \dfrac{-2}{1}$

y-int = 2 $y = -2x + 2$

_____ 1.

   a. $y = -3x + 2$ ~~c. $y = -3x - 2$~~
   ~~b. $y = -2x - 3$~~   ~~d. $y = 2x - 3$~~

$Y - Y_1 = m(X - X_1)$

Write an equation of the line, in point-slope form, that passes through the two given points.

$X_1\ Y_1\ \ X_2\ Y_2$

_____ 2. points: $(-4, 12), (8, -12)$

$m = \dfrac{Y_2 - Y_1}{X_2 - X_1} = \dfrac{-12 - 12}{8 - -4} = \dfrac{-24}{12} = -2$

   ~~a. $y - 12 = -\dfrac{1}{2}(x + 4)$~~   c. $y - 12 = -2(x + 4)$

   ~~b. $y - 4 = -2(x - 12)$~~   ~~d. $y - 4 = -\dfrac{1}{2}(x + 12)$~~

   ↑ should be y-value

What is an equation of the line, in point-slope form, that passes through the given point and has the given slope?

_____ 3. point: $(6, -8)$; slope: 6

   ~~a. $y - 8 = 6(x - 6)$~~   c. $y + 8 = 6(x - 6)$
   ~~b. $y - 8 = 6(x + 6)$~~   ~~d. $y + 8 = 6(x + 6)$~~

whole numbers → *Positive or negative*

What is the equation of the given line in standard form? Use integer coefficients.

_____ 4. $y = \frac{5}{3}x - 10$ $\left(-\frac{5}{3}x + y = -10\right)$ $\boxed{Ax + By = C}$

$-\frac{5}{3}x - \frac{5}{3}x$ $-5x + 3y = -30$

$\frac{3}{1} \cdot \frac{-5}{3} = \frac{-15}{3} = -5$

a. $5x + 3y = -30$ c. $-5x - 3y = -30$

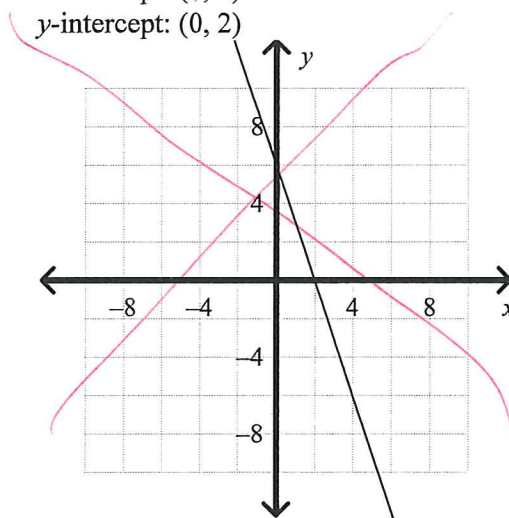b. $-5x + 3y = -10$ d. $\boxed{-5x + 3y = -30}$

What are the intercepts of the equation? Graph the equation.

_____ 5. $6x + 2y = 12$ For x-int., plug in y = 0. For y-int., plug in x = 0
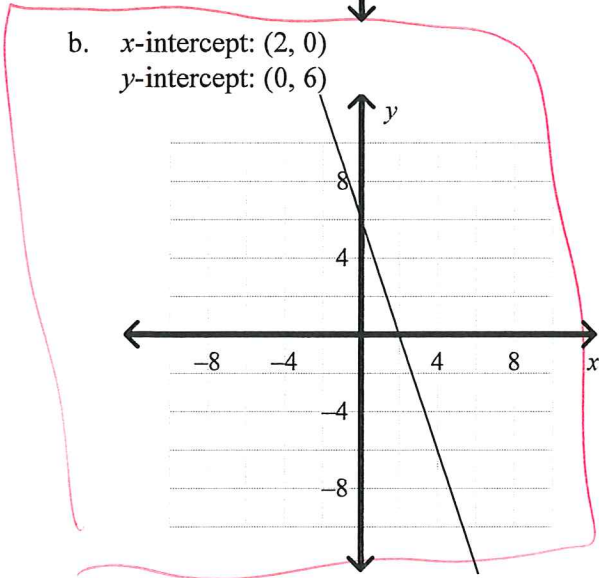
a. x-intercept: (2, 0)
    y-intercept: (0, 6)
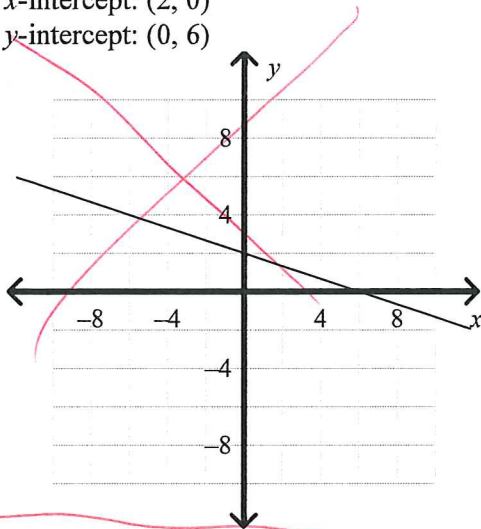
c. x-intercept: (6, 0)
    y-intercept: (0, 2)
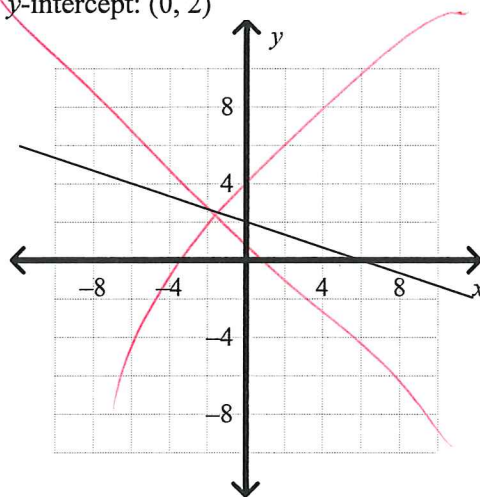

X-int:
$6x + 2(0) = 12$
$\frac{6x}{6} = \frac{12}{6}$
$x = 2$

b. x-intercept: (2, 0)
    y-intercept: (0, 6)

d. x-intercept: (6, 0)
    y-intercept: (0, 2)
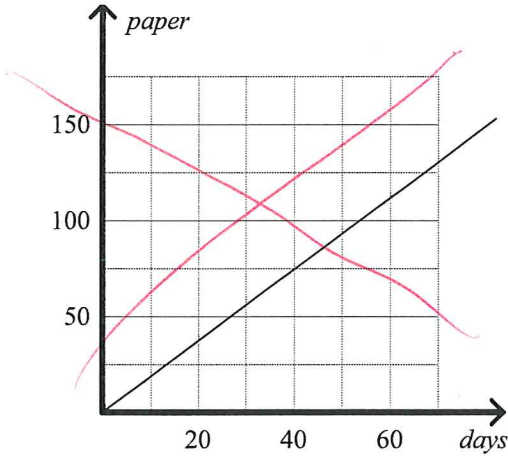

Y-Int:
$6(0) + 2y = 12$
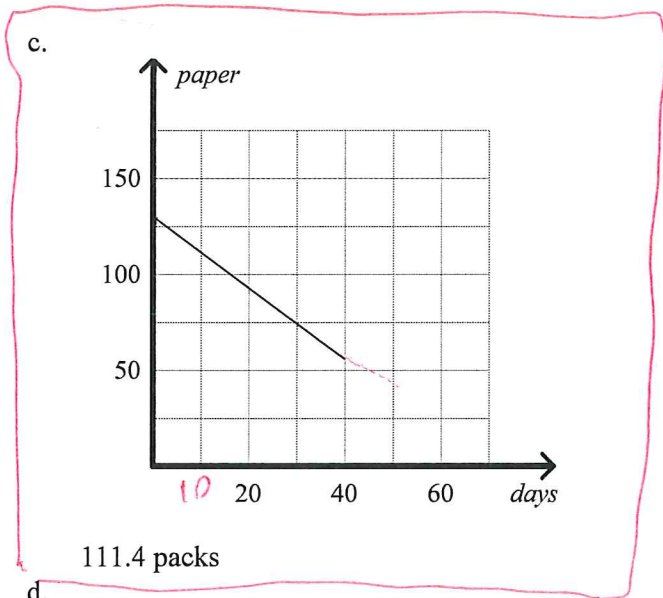$\frac{2y}{2} = \frac{12}{2}$
$y = 6$

Y-int

____ 6. The office manager of a small office ordered <u>130 packs</u> of printer paper. Based on average daily use, she knows that the paper will last about 70 days. What graph represents this situation? How many packs of printer paper should the manager expect to have after 10 days?
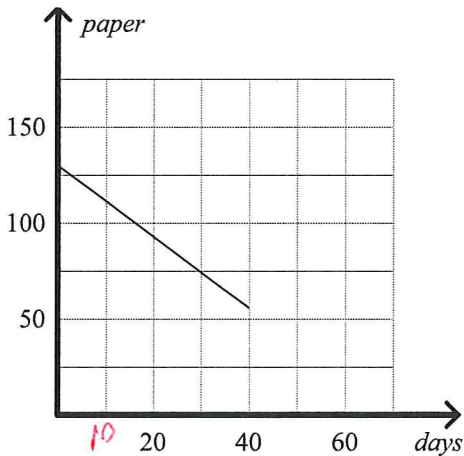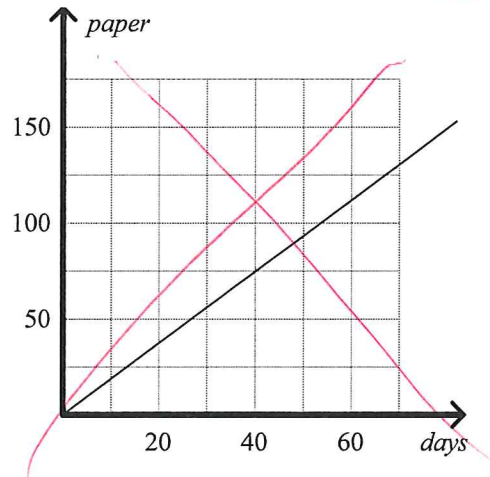
a.

paper

150

100

50

20   40   60   *days*

111.4 packs

c.

paper

150

100

50

10   20   40   60   *days*

111.4 packs

b.

paper

150

100

50

10   20   40   60   *days*

18.6 packs

d.

paper

150

100

50

20   40   60   *days*

18.6 packs

What is the equation of the line in slope-intercept form?

$y = mx + b$ $x\ y$

____ 7. the line parallel to $y = 2x - 3$ through $(-4, 1)$

a. $y = 2x + 9$

b. $y = 2x + 7$

c. $y = -\dfrac{1}{2}x + 9$

d. $y = -2x + 9$

Slope is the same when parallel

slope $= 2 = m$

$y = mx + b$

$1 = 2(-4) + b$

$1 = -8 + b$

$9 = b$

y-int

_____ 8. the line perpendicular to $y = \frac{5}{6}x - 3$ through $(-1, 3)$

$\frac{-6}{5} = $ slope

a. $y = \frac{6}{5}x + 1.8$

b. $y = -\frac{5}{6}x + 1.8$

c. $y = \frac{5}{6}x + 1.8$

d. $y = -\frac{6}{5}x + 1.8$

Opposite
Reciprocal
Slope

$y = mx + b$

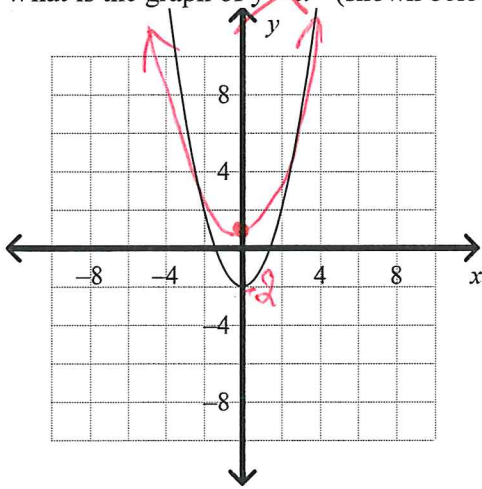$3 = \frac{-6}{5}(-1) + b$

$3 = \frac{6}{5} + b$
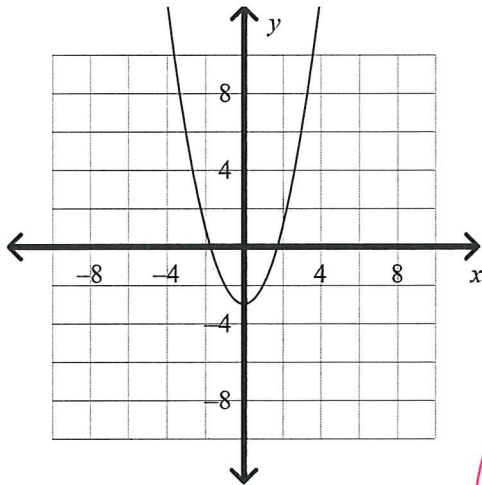
$3 = 1.2 + b$

$\underline{-1.2 \quad -1.2}$

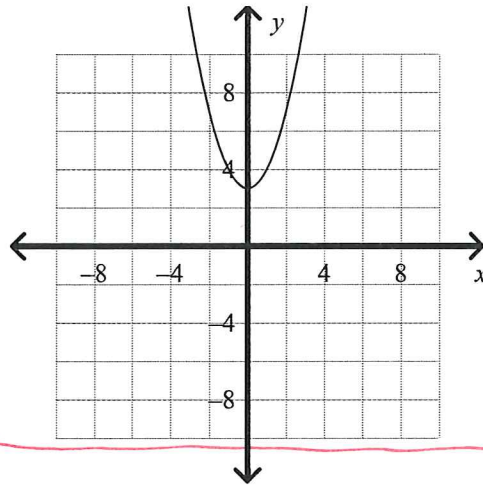$1.8 = b$

_____ 9. What is the graph of $y = x^2$ (shown below) translated up 3 units?
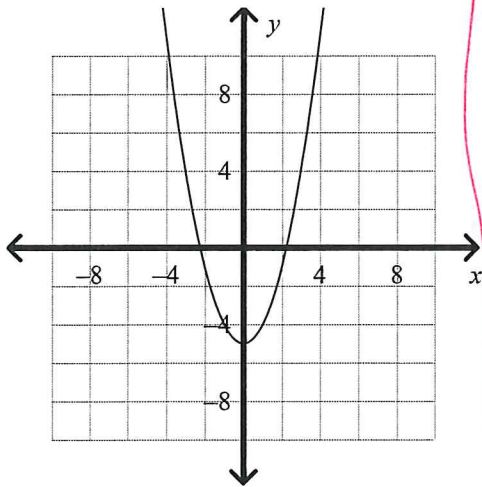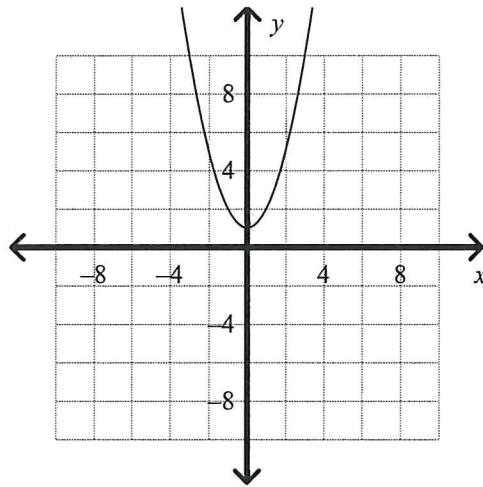
$y = x^2 - 2$

a.

c.

b.

d.

Short Answer

(1.) $f(x) + g(x) = (5x+7) + (-2x+3) = \boxed{3x+10}$

(2) $f(x) - g(x) = (5x+2) - (7x-6) = 5x+2-7x+6$
$$= \boxed{-2x+8}$$

(3) $f(x) \cdot g(x) = (6x+5) \cdot (3x+4) = 18x^2 + 24x + 15x + 20$
$$= \boxed{18x^2 + 39x + 20}$$

(4) $\dfrac{f}{g} = \dfrac{3x-6}{x-2} = \dfrac{3(x-2)}{x-2} = \boxed{3}$, $\quad \begin{array}{c} x-2 \neq 0 \\ x \neq 2 \end{array}$

(5) $(f \circ g)(-4)$ First find $f(g(x)) = f(-3x-5) = 4(-3x-5) - 7$
Plug in $x = -4$: $4(-3(-4)-5) - 7 = \boxed{21}$

(6) Inverse: Switch x & y values:

X	2	10	-10	-4
Y	-10	-7	-5	8

(7) ● 3 step process: ① Switch x & y: $x = 3y + 12$
② Solve for y: $\dfrac{-12 \qquad -12}{}$
$$\dfrac{x-12}{3} = \dfrac{3y}{3}$$
$$\dfrac{x-12}{3} = y$$

③ Switch y with $f^{-1}(x)$ $\boxed{f^{-1}(x) = \dfrac{x-12}{3}}$

(8)
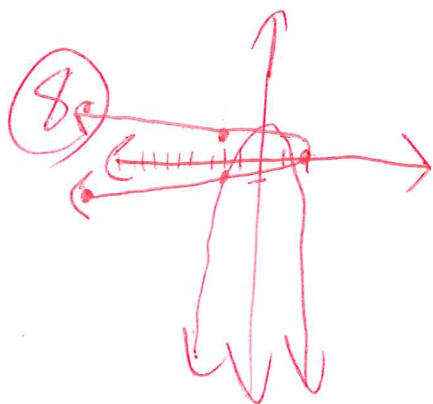
original:

X	Y
-2	-14
-1	-2
0	2
1	-2
2	-14

Inverse:

X	Y
-14	-2
-2	-1
2	0
-2	1
-14	2

⑨ Don't worry about this one.

⑩ 3 step process:
① $(x)^2 = (\sqrt{y-2})^2$

② $x^2 = y - 2$
  $ +2 \quad +2$
  _____
  $x^2 + 2 = y$

③ $x^2 + 2 = f^{-1}(x) \quad y \geq 2$

⑪ -2

⑫ $(-x)^2 + 4 = x^2 + 4$

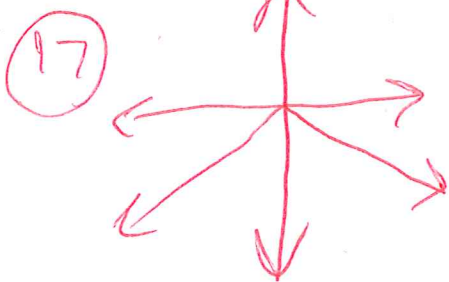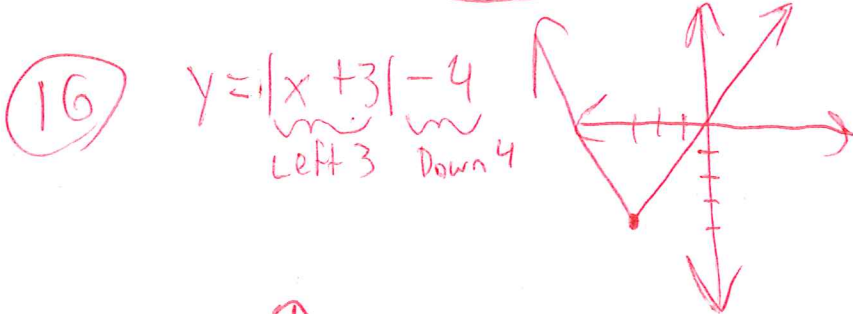⑬ $y = \frac{1}{2}x$

⑭ $(x+9)^2 - 2$
  Left 9 Down 2

⑮ $g(x) = (x-2)^2 + 8$
  Right 2 UP 8

⑯ $y = |x+3| - 4$
  Left 3 Down 4

⑰

(18) $C + A = \begin{bmatrix} 5 & 3 & -1 \\ -3 & 0 & 6 \end{bmatrix} + \begin{bmatrix} -5 & 4 \\ -8 & 2 \end{bmatrix}$ (Cannot Calculate)

(19) $\begin{bmatrix} -5 & -1 & 8 \\ -1 & 13 & 1 \end{bmatrix}$

(20) — (31) On following page.

Find the function rule for g(x).

14. The function $f(x) = x^2$. The graph of $g(x)$ is $f(x)$ translated to the left 9 units and down 2 units. What is the function rule for $g(x)$?

What transformations change the graph of f(x) to the graph of g(x)?

15. $f(x) = x^2$; $g(x) = (x-2)^2 + 8$

What is the graph of the absolute value equation?

16. $y = |x + 3| - 4$

What is the graph of the absolute value function?

17. $y = -\frac{1}{5}|x|$

Use matrices A, B, and C. Find the sum or difference if you can.

$$A = \begin{bmatrix} -5 & 4 \\ -8 & 2 \end{bmatrix} \quad B = \begin{bmatrix} -2 & 7 & -3 \\ 1 & -6 & 0 \end{bmatrix} \quad C = \begin{bmatrix} 5 & 3 & -1 \\ -3 & 0 & 6 \end{bmatrix}$$

18. $C + A$

19. $\begin{bmatrix} -3 & -1 & 7 \\ 0 & 8 & 2 \end{bmatrix} + \begin{bmatrix} -2 & 0 & 1 \\ -1 & 5 & -1 \end{bmatrix}$

Find the values of the variables.

20. $\begin{bmatrix} 5-t & 0 \\ 8 & 1 \end{bmatrix} = \begin{bmatrix} -5 & 0 \\ 8 & -y+2 \end{bmatrix}$

$$5 - t = -5$$
$$-5 \qquad -5$$
$$-t = -10$$
$$\boxed{t = 10}$$

$$1 = -y + 2$$
$$-2 \qquad -2$$
$$-1 = -y$$
$$\boxed{1 = y}$$

21. Find $4A - 2B$.

$$A = \begin{bmatrix} 3 & 6 \\ -2 & -8 \\ 9 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 8 & 4 \\ 1 & -7 \\ 9 & -9 \end{bmatrix}$$

$$4A = \begin{bmatrix} 12 & 24 \\ -8 & -32 \\ 36 & 4 \end{bmatrix} \quad 2B = \begin{bmatrix} 16 & 8 \\ 2 & -14 \\ 18 & -18 \end{bmatrix} \quad 4A - 2B = \begin{bmatrix} -4 & 16 \\ -10 & -18 \\ 18 & 22 \end{bmatrix}$$

7

Solve the matrix equation.

22. $-2X - 2\begin{bmatrix} 2 & -8 \\ -4 & 2 \end{bmatrix} = \begin{bmatrix} 4 & -6 \\ 2 & -8 \end{bmatrix}$

$\rightarrow -2X - \begin{bmatrix} 4 & -16 \\ -8 & 4 \end{bmatrix} = \begin{bmatrix} 4 & -6 \\ 2 & -8 \end{bmatrix}$ $\rightarrow \frac{1}{2} \cdot 2X = \begin{bmatrix} 8 & -22 \\ -6 & -4 \end{bmatrix} \cdot \frac{1}{2}$

$X = \begin{bmatrix} 4 & -11 \\ -3 & -2 \end{bmatrix}$

23. $\begin{bmatrix} 4 & -7 \\ 1 & -8 \end{bmatrix} - X = \begin{bmatrix} 0 & 4 \\ 7 & 5 \end{bmatrix} + X$

$X = \begin{bmatrix} 4 & -7 \\ 1 & -8 \end{bmatrix} - \begin{bmatrix} 0 & 4 \\ 7 & 5 \end{bmatrix} =$

$X = \begin{bmatrix} 4 & -11 \\ -6 & -13 \end{bmatrix}$

24. $X + 2\begin{bmatrix} 2 & -8 \\ -4 & 2 \end{bmatrix} = \begin{bmatrix} 4 & -6 \\ 2 & -8 \end{bmatrix}$

$X + \begin{bmatrix} 4 & -16 \\ -8 & 4 \end{bmatrix} = \begin{bmatrix} 4 & -6 \\ 2 & -8 \end{bmatrix}$ $X = \begin{bmatrix} 4 & -6 \\ 2 & -8 \end{bmatrix} - \begin{bmatrix} 4 & -16 \\ -8 & 4 \end{bmatrix}$

$X = \begin{bmatrix} 0 & -22 \\ 10 & -12 \end{bmatrix}$

Find the product.

25. $\underset{A}{\begin{bmatrix} 0 & 2 \\ -6 & 9 \end{bmatrix}} \underset{B}{\begin{bmatrix} -7 & 7 \\ 0 & 9 \end{bmatrix}} = \begin{bmatrix} 0 & 18 \\ 42 & 39 \end{bmatrix}$ on calculator

Determine whether the product is defined or undefined. If defined, give the dimensions of the product matrix.

26. $\underset{A}{\begin{bmatrix} 1 & 1 & -4 \\ 5 & 6 & 0 \end{bmatrix}} \underset{B}{\begin{bmatrix} 9 \\ 1 \\ -7 \end{bmatrix}}$

$2 \times 3 \quad 3 \times 1$

Because inner #'s are the same, yes we can multiply.

New dimensions: 2×1

Evaluate the determinant of the matrix.

27. $\begin{bmatrix} -11 & 7 \\ 5 & -4 \end{bmatrix} = 9$

28. $\begin{bmatrix} 1 & -5 & 2 \\ -3 & -5 & -2 \\ -1 & -2 & -3 \end{bmatrix} = 48$

Does the given matrix, A, have an inverse? If it does, what is A^{-1}?

29. $A = \begin{bmatrix} 5 & -3 \\ 2 & -1 \end{bmatrix}$ Yes, $\begin{bmatrix} -1 & 3 \\ -2 & 5 \end{bmatrix}$

30.

Write the system $\begin{cases} 9y + z = -1 \\ 2x - 5y = -6 \\ 4x - 2z = 5 \end{cases}$ as a matrix equation.

$x \quad y \quad z = const$

$0x + 9y + z = -1$
$2x - 5y + 0z = -6$
$4x + 0y - 2z = 5$

$\begin{bmatrix} 0 & 9 & 1 \\ 2 & -5 & 0 \\ 4 & 0 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ -6 \\ 5 \end{bmatrix}$

What is the solution of the system? Solve using matrices.

31. $\begin{cases} 3x + 2y = 5 \\ 2x + y = 2 \end{cases}$

$\underset{A}{\begin{bmatrix} 3 & 2 \\ 2 & 1 \end{bmatrix}} \underset{X}{\begin{bmatrix} x \\ y \end{bmatrix}} = \underset{B}{\begin{bmatrix} 5 \\ 2 \end{bmatrix}}$

$X = A^{-1} B$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -1 \\ 4 \end{bmatrix} \quad (-1, 4)$