1. Use slope-intercept form to find the equation of the line having a slope of 3 and a y-intercept of 5.

$y = mx + b$
$y = 3x + 5$

2. Determine the equation of a line passing through the point (5, -3) with an undefined slope.

vertical line $x = 5$

3. Determine the equation of a line passing through the point (-4, 2) with a slope of 0.

horiz. line $y = 2$

4. Use point-slope form to find the equation of the line passing through the point (0, 5) with a slope of 2/3.

$y - y_1 = m(x - x_1)$
$y - 5 = \frac{2}{3}(x - 0)$
$y - 5 = \frac{2}{3}x$

5. Find the equation of a line passing through the point (2, 8) and parallel to the line $y = \frac{5}{6}x - 1$.

$m = 5/6$

$y - 8 = 5/6(x - 2)$ point slope
$6y - 48 = 5x - 10$
$5x - 6y = -38$ standard form
$y = \frac{5}{6}x + \frac{38}{6}$ slope-intercept form

6. Find the equation of a line perpendicular to the y-axis passing through the point (4, 7).

y-axis $m = und$
$\perp m = 0$

$y - 7 = 0(x - 4)$
$y = 7$

7. Find the equation of a line passing through the points (-3, 6) and (1, 2).

$m = \frac{2-6}{1-(-3)} = \frac{-4}{4} = -1$

$y - 6 = -1(x - (-3))$
$y - 6 = -x - 3$
$y = -x + 3$

8. Find the equation of a line with an x-intercept (2, 0) and a y-intercept (0, 3).

$m = -\frac{3}{2}$ $y = \frac{3}{2}x + 3$

Using the point-slope form $y - y_1 = m(x - x_1)$, write an equation for the line

1. with slope -2, containing the point (3, 4)

1. $y - 4 = -2(x - 3)$

2. containing the points (1, -3) and (-5, 2)

$m = \frac{2-3}{-5-1} = \frac{5}{-6}$

2. $y - 2 = \frac{-5}{6}(x + 5)$ or $y + 3 = \frac{-5}{6}(x - 1)$

3. with slope 0, containing the point (4, 2)

3. $y = 2$

4. perpendicular to the line in problem #1, containing the point (3, 4)

$m = \frac{1}{2}$

4. $y - 4 = \frac{1}{2}(x - 3)$

①

I. Polynomials

A. Factor Completely.

1) $t^2 - 4t - 21$

$(t - 7)(t + 3)$

2) $x^3 - 8$

$(x - 2)(x^2 + 2x + 4)$

3) $27x^3 + 125$

$(3x + 5)(9x^2 - 15x + 25)$

4) $10m^3n^2 - 15m^2n + 25m$

$5m(2m^2n^2 - 3mn + 5)$

5) $25x^2 - 49$

$(5x + 7)(5x - 7)$

6) $x^3 - 2x^2 - 4x + 8$

$x^2(x - 2) - 4(x - 2)$

$(x^2 - 4)(x - 2)$

$(x + 2)(x - 2)(x - 2)$

B. Simplify the following expressions.

1) $(-3x^2 + 4x - 7) + (2x^2 - 7x + 8)$

$-x^2 - 3x + 1$

2) $5x^2 \cdot 2x^5$

$10x^7$

3) $(-2c^3)^2$

$4c^6$

4) $(39a^4 - 4a^3 + 2a^2 - a - 7) - (10a^4 + 3a^3 - 2a^2 - a + 8)$

$29a^4 - 7a^3 + 4a^2 - 15$

5) $\dfrac{283x^{-5}y^{21}}{6x^{-5}y^{25}}$ $\dfrac{283x^{10}}{6y^4}$

6) $(3x + 7)(2x + 5)$

$6x^2 + 29x + 35$

7) $-3xy^3(x - 2y)$

$-3x^2y^3 + 6xy^4$

8) $(3x^2 + x - 1)(2x - 3)$

$6x^3 - 9x^2 + 2x^2 - 3x - 2x + 3$

$6x^3 - 7x^2 - 5x + 3$

9) $(8a^3b^2)(2aV)$

$16a^4b^3$

10) $(-3x^2y^3z)^3$

$-27x^6y^9z^3$

11) $(15a^4b^2c)^0$

1

12) $\dfrac{3x^3y^2}{6x^2y^5}$ $\dfrac{x}{2y^3}$

13) $(x + 6)^2$

$x^2 + 12x + 36$

14) $t^3 \cdot t^{(n-3)}$

$t^3(t^n \cdot t^{-3})$

$t^n \cdot t^0 = t^n$

15) $(x^m)^n \cdot (x^n)^{n-m}$

$x^{mn} \cdot x^{n^2} \cdot x^{-nm}$

$x^{n^2} \cdot x^0 = x^{n^2}$

16) $\dfrac{4^{h-k}}{4^{h-k}}$ $= \dfrac{4^h \cdot 4^{-k}}{4^h \cdot 4^k} = \dfrac{1}{4^{2k}}$

C. Solve the following quadratic equations for x.

1) $(2x+1)(x + 3) = 0$

$2x+1 = 0$ $x + 3 = 0$

$x = -\frac{1}{2}$ $x = -3$

2) $x^2 + 6x = 0$

$x(x + 6) = 0$

$x = 0$ $x = -6$

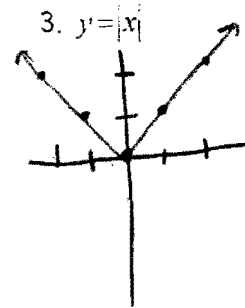3) $2x^2 + 4x = -3$

$2x^2 + 4x + 3 = 0$ does not factor
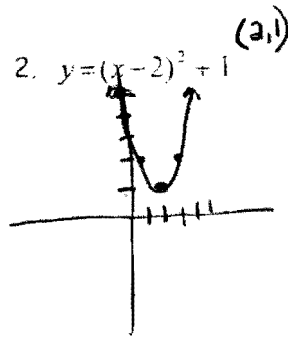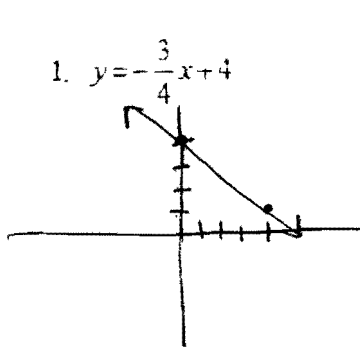
$\dfrac{-4 \pm \sqrt{16 - 4(2)(3)}}{4} = \dfrac{-4 \pm \sqrt{-8}}{4}$

$= \dfrac{-4 \pm 2i\sqrt{2}}{4} = \dfrac{-2 \pm i\sqrt{2}}{2}$

4) $x^2 = 16$
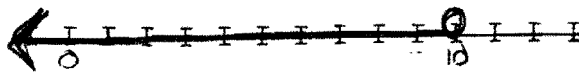
$x = \pm\sqrt{16}$

$x = \pm 4$

②

II. Linear Operations/Solving Inequalities

A. Create your own grid and graph the following equations.

1. $y = -\dfrac{3}{4}x + 4$

2. $y = (x-2)^2 + 1$ (2,1)

3. $y = |x|$

B. Solve the inequality and graph the solution set on a number line:

1. $4(t+2) - 3 > 7(t+5)$
$4t + 8 - 3 > 7t + 35$
$-3t > 30$
$t < -10$

2. $|x - 8| = 3$
$x - 8 = 3 \qquad x - 8 = -3$
$x = 11 \qquad x = 5$

C. Answer each of the following concerning linear equations. If question does not specify, leave answer in any acceptable equation of a line

1) Determine the slope of the line containing the points (6, -2) and (-1, 5).
$m = \dfrac{5 - (-2)}{-1 - 6} = \dfrac{7}{-7} = -1$

2) Determine an equation for a line with slope $\dfrac{1}{2}$ and y-intercept at (0, -3).
$y = \dfrac{1}{2}x - 3$

3) Determine an equation for a line parallel to $y = -3x + 4$ containing the point (2, 1).
$m = -3 \qquad y - 1 = -3(x - 2)$

4) Line m is perpendicular to $y = 4x - 1$ and passes through the origin. What is the equation of line m.
$m = -\dfrac{1}{4} \qquad (0,0) \quad y - n + = 0$
$y = -\dfrac{1}{4}x$

③

1. $\dfrac{\sqrt{x}}{x} \cdot \dfrac{x^{1/6}}{x} = x^{1/12}$

2. $e^{\ln 3}$ 3

3. $e^{(1+\ln x)}$ $e^1 \cdot e^{\ln x} = ex$

4. $\ln 1$ 0

5. $\ln e^7$ 7

6. $\log_3(1/3) = x$

$$3^x = \tfrac{1}{3}$$
$$3^x = 3^{-1}$$
$$\boxed{x = -1}$$

7. $\log_{1/2} 8 = x$

$$\tfrac{1}{2}^x = 8$$
$$\tfrac{1}{2}^x = 2^3$$
$$2^{-x} = 2^3$$
$$\boxed{x = -3}$$

8. $\ln \tfrac{1}{2}$ use calculator $-.693$

9. $\dfrac{e^{3\ln x}}{e^{\ln x^3}}$ x^3

10. $\dfrac{4xy^{-2}}{12x^{-\frac{1}{3}}y^{-5}}$ $\dfrac{1\,x^{4/3}\,y^3}{3}$

11. $27^{2/3}$ 9 $\sqrt[3]{27}^{\,2}$

12. $\dfrac{(5a^{2/3})(4a^{3/2})}{a^{4/6}\ a^{9/6}}$ $20\,a^{13/6}$

13. $\dfrac{(4a^{5/3})^{3/2}}{\sqrt{4}^{\,3}}$ $8a^{15/6} = 8a^{5/2}$

* 14. $\dfrac{3(n-1)!}{5n!}$ $\dfrac{3(n+1)}{5}$

$$\dfrac{3(n+1)!}{5n!} = \dfrac{3(n+1)(n!)}{5n!}$$

Simplify

1. $5\log_3 x + 7\log_3 y = \log_3 x^5 y^7$
   $\log_3 x^5 + \log_3 y^7$

2. $6\log x - 4\log y - 2\log z = \log \dfrac{x^6}{y^4 z^2}$
   $\log x^6 - \log y^4 - \log z^2$

3. $3(\log_3 x - 4\log_3 y) = 3\left(\log_3 \tfrac{x}{y^4}\right) = \log_3 \dfrac{x^3}{y^{12}}$
   $3(\log_3 x - \log_3 y^4)$

4. $\log \tfrac{1}{x} + 4\log x$
   $\log x^{-1} + \log x^4 = \log x^4 = \log \tfrac{1}{x^4}$

5. $20\log \sqrt[5]{x}$ $x^{1/5} = \log(x^{1/5})^{20} = \log x^4$
   $20\log x^{1/5}$

6. $3\log_3 x - \log_3 \tfrac{1}{y} = \log_3 \dfrac{x^3}{1/y} = \log_3 x^3 y$
   $\log_3 x^3 - \log_3 \tfrac{1}{y}$

7. $\tfrac{1}{2}(\log x + 3\log y) - 2\log z$
   $\tfrac{1}{2}(\log x + \log y^3) - \log z^2$
   $\tfrac{1}{2}\log xy^3 - \log z^2$
   $\log (xy^3)^{1/2} - \log z^2 = \log \dfrac{x^{1/2} y^{3/2}}{z^2}$

Solve

8. $3^x = 8$
   $\ln 3^x = \ln 8$
   $x\ln 3 = \ln 8$
   $x = \ln 8 / \ln 3 = 1.893$

9. $5^{x+1} = 12$
   $5^x \cdot 5 = 12$ $5^x = \tfrac{12}{5}$
   $x\ln 5 = \ln 12/5$
   $x = \dfrac{\ln 12/5}{\ln 5} = .544$

10. $7^{2x} = 11$
    $2x\ln 7 = \ln 11$
    $x = \ln 11 / 2\ln 7 =$

11. $5^x = 3^{x+1}$
    $5^x = 3^x \cdot 3$ $\left(\tfrac{5}{3}\right)^x = 3$
    $x\ln \tfrac{5}{3} = \ln 3$
    $x = \ln 3 / \ln \tfrac{5}{3} = 2.151$

12. $2^{x+1} = 9^x$
    $2^x \cdot 2 = 9^x$ $2 = \left(\tfrac{9}{2}\right)^x$
    $\ln 2 = x\ln \tfrac{9}{2}$
    $\dfrac{\ln 2}{\ln 9/2} = x$ $x = .461$

13. $3^x = 5^{1-x}$
    $3^x = 5^1 \cdot 5^{-x}$
    $\dfrac{3^x}{5^{-x}} = 5$
    $\dfrac{3^x}{5^x} = 5$
    $3^x 5^x = 5$
    $15^x = 5$
    $x\ln 15 = \ln 5$ $x = \dfrac{\ln 5}{\ln 15} = .594$ ④

Solving Quadratic Equations Assignment

1. Solve for x.

a. $x^2 + 7x - 18 = 0$

$(x + 9)(x - 2) = 0$

$\boxed{x = -9, 2}$

b. $x^2 + x + \frac{1}{4} = 0$

$4x^2 + 4x + 1 = 0$

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

$2x + 1 = 0$

$\boxed{x = -\frac{1}{2}}$

c. $2x^2 - 72 = 0$

$2(x^2 - 36) = 0$

$2(x + 6)(x - 6) = 0$

$\boxed{x = -6, 6}$

d. $12x^2 - 5x = 2$

$12x^2 - 5x - 2 = 0$

$(3x - 2)(4x + 1) = 0$

$\boxed{x = 2, -\frac{1}{4}}$

e. $20x^2 - 56x + 15 = 0$

$(10x - 3)(2x - 5) = 0$

$\boxed{x = \frac{3}{10}, \frac{5}{2}}$

f. $81x^2 + 72x + 16 = 0$

$(9x + 4)(9x + 4) = 0$

$\boxed{x = -\frac{4}{9}}$

g. $x^2 + 10x = 7$

$x^2 + 10x - 7 = 0$

$x = \dfrac{-10 \pm \sqrt{10^2 - 4(1)(-7)}}{2}$

$x = \dfrac{-10 \pm \sqrt{128}}{2} = \dfrac{-10 \pm 8\sqrt{2}}{2}$

$\boxed{x = -5 \pm 4\sqrt{2}}$

h. $3x - 4x^2 = -5$

$-4x^2 - 3x + 5 = 0$

$x = \dfrac{3 \pm \sqrt{9 - 4(-4)(5)}}{-8}$

$\boxed{x = \dfrac{3 \pm \sqrt{89}}{-8}}$

i. $7x^2 - 7x + 2 = 0$

$x = \dfrac{7 \pm \sqrt{49 - 4(7)(2)}}{14} = \dfrac{7 \pm \sqrt{-7}}{14}$

$\boxed{x = \dfrac{7 \pm i\sqrt{7}}{14}}$ or $\boxed{\dfrac{1}{2} \pm \dfrac{i\sqrt{7}}{14}}$

j. $x + \frac{1}{x} = \frac{17}{4}$

$x^2 + 1 = \frac{17}{4}x$

$x^2 - \frac{17}{4}x + 1 = 0$

$4x^2 - 17x + 4 = 0$

$x = \dfrac{17 \pm \sqrt{289 - 4(4)(4)}}{8} = \dfrac{17 \pm 15}{8}$

$\boxed{x = 4, \frac{1}{4}}$

k. $x^3 - 5x^2 + 5x - 25 = 0$

$x^2(x - 5) + 5(x - 5) = 0$

$(x - 5)(x^2 + 5) = 0$

$\boxed{x = 5, \pm i\sqrt{5}}$

l. $2x^4 - 15x^3 + 18x^2 = 0$

$x^2(2x^2 - 15x + 18) = 0$

$x^2(2x - 3)(x - 6) = 0$

$\boxed{x = 0, \frac{3}{2}, 6}$

2) If $y = x^2 + kx - k$, for what values of k will the quadratic have two real solutions?

$k = -4$

3. Find the domain of $y = \dfrac{2x - 1}{6x^2 - 5x - 6}$

$6x^2 - 5x - 6 = 0$

$(3x + 2)(2x - 3) = 0$

$\boxed{x \neq -\frac{2}{3} \quad x \neq \frac{3}{2}}$

Special Factorization - Assignment

• Completely factor the following expressions

1. $x^3 - 25x$

$x(x^2 - 25)$

$x(x+5)(x-5)$

2. $30x - 9x^2 - 25$

$-9x^2 + 30x - 25$

$-(9x^2 - 30x + 25)$

$-(3x-5)(3x-5)$

3. $3x^2 - 5x^2 + 2x$

$-2x^2 + 2x$

$-2x(x-1)$

4. $3x^8 - 3$

$3(x^8 - 1)$

$3(x-1)(x^2 + x + 1)$

5. $16x^4 - 24x^2y + 9y^2$

$(4x^2 - 3y)(4x^2 - 3y)$

6. $9a^4 - a^2b^2$

$a^2(9a^2 - b^2)$

$a^2(3a+b)(3a-b)$

7. $4x^4 + 7x^2 - 36$

$(4x^2 - 9)(x^2 + 4)$

$(2x+3)(2x-3)(x^2+4)$

8. $250x^3 - 128$

$2(125x^3 - 64)$

$2(5x-4)(25x^2 + 20x + 16)$

✦9. $\dfrac{8x^3}{125} + \dfrac{64}{y^3} = 8\left[\left(\dfrac{x}{5}\right)^3 + \left(\dfrac{2}{y}\right)^3\right]$

$8\left(\dfrac{x}{5} + \dfrac{2}{y}\right)\left(\dfrac{x^2}{25} - \dfrac{2x}{5y} + \dfrac{4}{y^2}\right)$

10. $x^5 + 17x^3 + 16x$

$x(x^4 + 17x^2 + 16)$

$x(x^2 + 16)(x^2 + 1)$

11. $144 + 32x^2 - x^4$

$-x^4 + 32x^2 + 144$

$-(x^4 - 32x^2 - 144)$

$-(x^2 + 36)(x^2 + 4)$

✦12. $16x^{4a} - y^{8a}$

$(4x^{2a} + y^{4a})(4x^{2a} - y^{4a})$

$(4x^{2a} + y^{4a})(2x^a + y^{2a})(2x^a - y^{2a})$

13. $x^3 - xy^2 + x^2y - y^3$

$x(x^2 - y^2) + y(x^2 - y^2)$

$(x^2 - y^2)(x + y)$

$(x+y)(x-y)(x+y)$

$(x+y)^2(x-y)$

14. $x^6 - 9x^4 - 81x^2 + 729$

$x^4(x^2 - 9) - 81(x^2 - 9)$

$(x^2 - 9)(x^4 - 81)$

$(x+3)(x-3)(x^2+9)(x^2-9)$

$(x+3)(x-3)(x^2+9)(x+3)(x-3)$

✦15. $x^2 - 8xy + 16y^2 - 25$

$(x-4y)(x-4y) - 25$

$(x-4y)^2 - 25$

$[(x-4y)+5][(x-4y)-5]$

16. $x^5 + x^3 + x^2 + 1$

$x^3(x^2 + 1) + (x^2 + 1)$

$(x^2 + 1)(x^3 + 1)$

$(x^2 + 1)(x+1)(x^2 - x + 1)$

17. $x^6 - 1$

$(x^3 - 1)(x^3 + 1)$

$(x-1)(x^2 + x + 1)(x+1)(x^2 - x + 1)$

18. $x^6 + 1$ $(x^2)^3 + (1)^3$

$(x^2 + 1)(x^4 - x^2 + 1)$

⑥

Given $f(x) = 7 - x^2$ and $g(x) = x - 4$, find each value.

1. $f(-4)$

$7 - 16 = -9$

2. $g(-4)$

-8

3. $f(g(-2))$

$f(-6) = 7 - 36 = -29$

4. $f(4a)$

$7 - (4a)^2 =$
$7 - 16a^2$

5. $f(t+1)$

$7 - (t+1)^2 = 7 - (t^2 + 2t + 1)$
$7 - t^2 - 2t - 1 =$
$-t^2 - 2t + 6$

6. $[f \circ g](x) = f(g(x))$

$7 - (x-4)^2 =$
$7 - (x^2 - 8x + 16) = -x^2 + 8x - 9$

7. $[g \circ f](x) = g(f(x))$

$7 - x^2 - 4 = -x^2 + 3$

Given the following functions, $f(x) = -3(x-2)^2 - 1$ and $g(x) = \dfrac{2x-3}{x+5}$, find:

$g(2) = \dfrac{1}{7}$

8. a. $f(g(2))$

$f(1/7) = -3\left(-\dfrac{13}{7}\right)^2$
$= -3\left(\dfrac{169}{49}\right) = \dfrac{-507}{49} - \dfrac{49}{49}$

$\boxed{\dfrac{-556}{49}}$

b. $g(f(2))$ $f(2) = -1$

$g(-1) = \boxed{\dfrac{-5}{4}}$

9. If $g(x) = x^2 - 5x + 12$ then find:

a. $g(-6)$ $36 + 30 + 12 = \boxed{78}$

b. $g(x-2)$

$(x-2)^2 - 5(x-2) + 12$
$x^2 - 4x + 4 - 5x + 10 + 12$
$\boxed{x^2 - 9x + 26}$

Simplify the following rational expressions.

10.

$\dfrac{x}{4} + \dfrac{2x}{3}$
$\dfrac{3x}{12} + \dfrac{8x}{12} = \boxed{\dfrac{11x}{12}}$

$\dfrac{3x^2}{8} \cdot \dfrac{14}{9x} = \boxed{\dfrac{7x}{12}}$

$\dfrac{2}{3} \div \dfrac{1}{4}$ $\dfrac{2}{3} \cdot 4 = \boxed{\dfrac{8}{3}}$

c.

$(x-5)(x+4)$

$\dfrac{x^2 - x - 20}{x+4} \cdot \dfrac{x-3}{x^2 - 2x - 15}$

$(x-5)(x+3)$

$\boxed{\dfrac{x-3}{x+3}}$

$\dfrac{2x+1}{x^2 - 4} + \dfrac{5}{x-2}$
$(x+2)(x-2)$

$\dfrac{2x+1}{(x+2)(x-2)} + \dfrac{5(x+2)}{(x+2)(x-2)}$

$\dfrac{2x+1 + 5x + 10}{(x+2)(x-2)}$

$\boxed{\dfrac{2x+11}{(x+2)(x-2)}}$

Solve the equation: $\dfrac{-2}{x+3} = \dfrac{1}{x+1}$

$-2x - 2 = x + 3$
$-3x = 5$
$\boxed{x = -5/3}$

⑦

Linear Functions - Assignment

1. Find the equation of the line in slope-intercept form, with the given slope, passing through the given point

a. $m = -7, (-3, -7)$

$y + 7 = -7(x+3)$
$y + 7 = -7x - 21$
$\boxed{y = -7x - 28}$

b. $m = \dfrac{-1}{2}, (2, -8)$

$y + 8 = -\frac{1}{2}(x-2)$
$2y + 16 = -x + 2$
$2y = -x - 14$
$\boxed{y = -\frac{1}{2}x - 7}$

c. $m = \dfrac{2}{3}, \left(-6, \dfrac{1}{3}\right)$

$y - \frac{1}{3} = \frac{2}{3}(x+6)$
$3y - 1 = 2x + 12$
$3y = 2x + 13$
$\boxed{y = \frac{2}{3}x + 13/3}$

2. Find the equation of the line in slope-intercept form, passing through the following points.

a. $(-3, 6)$ and $(-1, 2)$

$m = \frac{2-6}{-1+3} = \frac{-4}{2} = -2$
$y - 6 = -2(x+3)$
$y - 6 = -2x - 6$
$\boxed{y = -2x}$

b. $(-7, 1)$ and $(3, -4)$

$m = \frac{-4-1}{3+7} = \frac{-5}{10} = -\frac{1}{2}$
$y - 1 = -\frac{1}{2}(x+7)$
$2y - 2 = -x - 7$
$2y = -x - 5$
$\boxed{y = -\frac{1}{2}x - 5/2}$

c. $\left(-2, \dfrac{2}{3}\right)$ and $\left(\dfrac{1}{2}, 1\right)$

$m = \frac{1 - \frac{2}{3}}{\frac{1}{2}+2} = \frac{\frac{1}{3}}{\frac{5}{2}} = \frac{2}{15}$
$y - 1 = \frac{2}{15}\left(x - \frac{1}{2}\right)$
$15y - 15 = 2x - 1$
$15y = 2x + 14$
$\boxed{y = \frac{2}{15}x + \frac{14}{15}}$

3. Write equations of the line through the given point a) parallel and b) normal to the given line.

a. $(5, -3)$, $x + y = 4$ $y = -x + 4$

$y + 3 = -1(x-5)$
$y + 3 = -x + 5$
$\boxed{y = -x + 2}$
parallel

$y + 3 = 1(x-5)$
$y + 3 = x - 5$
$\boxed{y = x - 8}$
perp.

b. $(-6, 2)$, $5x + 2y = 7$ $2y = -5x + 7$ $y = -\frac{5}{2}x + \frac{7}{2}$

$y - 2 = -\frac{5}{2}(x+6)$
$2y - 4 = -5x - 30$
$2y = -5x - 26$
$\boxed{y = -\frac{5}{2}x - 13}$
parallel

$y - 2 = \frac{2}{5}(x+6)$
$5y - 10 = 2x + 12$
$5y = 2x + 22$
$\boxed{y = \frac{2}{5}x + \frac{22}{5}}$
perp.

c. $(-3, -4)$, $y = -2$ $m = 0$

$y + 4 = 0(x+3)$
$\boxed{y = -4}$
parallel

$\boxed{x = -3}$
perp

4. Find an equation of the line containing $(4, -2)$ and parallel to the line containing $(-1, 4)$ and $(2, 3)$. Put your answer in general form.

$m = \frac{3-4}{2+1} = -\frac{1}{3}$

$y + 2 = -\frac{1}{3}(x-4)$
$3y + 6 = -x + 4$
$\boxed{x + 3y = -2}$

5. Find k if the lines $3x - 5y = 9$ and $2x + ky = 11$ are a) parallel and b) perpendicular.

a) $-5y = -3x + 9$
$y = \frac{3}{5}x - \frac{9}{5}$

$ky = -2x + 11$
$y = -\frac{2}{k}x + \frac{11}{k}$

$\frac{3}{5} = -\frac{2}{k}$
$3k = -10$
$\boxed{k = -10/3}$

b) $\frac{3}{5} = \frac{k}{2}$
$5k = 6$
$\boxed{k = 6/5}$

⑧