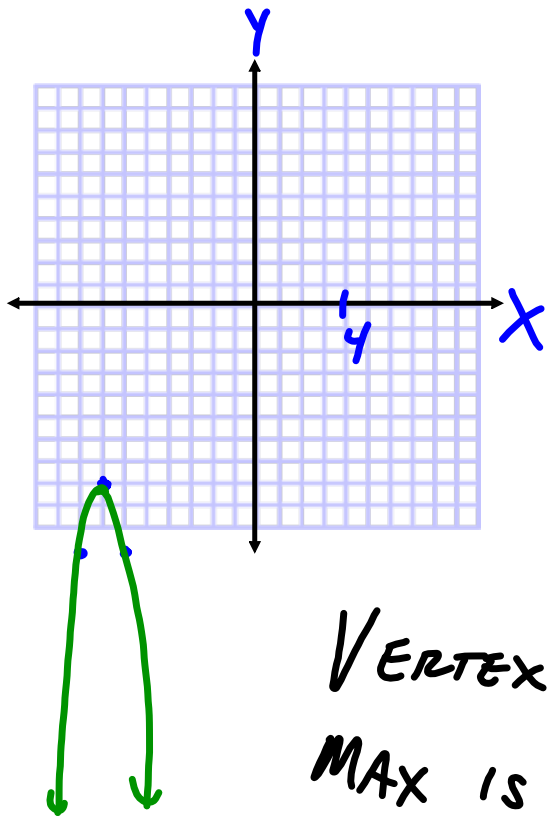
1) (5 points) **Section 4.1** Graph the function using translations. Find the vertex, the extreme value (Maximum or Minimum), and the Axis of Symmetry. Give the Domain and Range of the function.

$y = -3(x + 7)^2 - 8$



8 DOWN

7 LEFT

OPENS DOWN

3 TIMES AS STEEP.

VERTEX: $(-7, -8)$

MAX IS -8

NO MIN

AXIS OF SYM: $x = -7$

DOMAIN: ALL REALS $\mathbb{R}$

RANGE: $y \leq -8$

2) (5 points) **Section 4.2** Find the vertex of the quadratic given below.

$y = 2x^2 - 5x + 12$

$x = \frac{-b}{2a} = \frac{-(-5)}{2(2)}$

$= \frac{5}{4}$

$y = 2\left(\frac{5}{4}\right)^2 - 5\left(\frac{5}{4}\right) + 12$

$y = 2\left(\frac{25}{16}\right) - \frac{25}{4} + 12$

$y = \frac{25}{8} - \frac{50}{8} + \frac{96}{8}$

$y = \frac{71}{8}$

$V: \left(\frac{5}{4}, \frac{71}{8}\right)$

OR

$y = 2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) + 12 - \frac{25}{8}$

$y = 2\left(x - \frac{5}{4}\right)^2 + \frac{71}{8}$

$V: \left(\frac{5}{4}, \frac{71}{8}\right)$

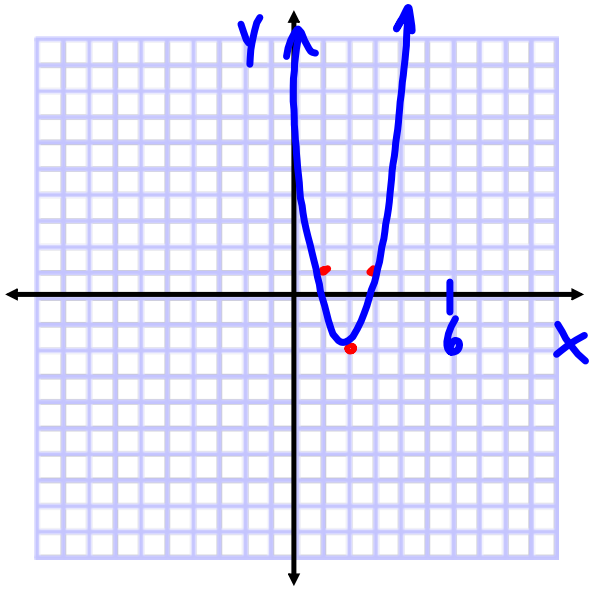
3) (7 points) **Section 4.2** Use "Completing the Square" to place the function below into vertex form $y = a(x - h)^2 + k$ and graph the function.

$$y = 3x^2 - 12x + 10$$

$y = 3(x^2 - 4x \quad) + 10$

$+4 \qquad\qquad -12$

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



4) (5 points) **Section 4.4** Factor the expressions given below. Remember to factor completely

a) $2x^3 - 4x^2 - 8x$

b) $x^2 - 13x + 36$

c) $2x^2 - 19x + 24$

d) $12y^2 - 75$

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

b) $(x-4)(x-9)$

c) $(2x-3)(x-8)$

48, -16, -3, -19; $2, -8$; $1, -3$

d) $3(4y^2 - 25)$

$3(2y-5)(2y+5)$

5) (5 points) **Section 4.5** Solve the equation given below by *factoring*.

$2x^2 + 8x = 5x + 20$

$2x^2 + 3x - 20 = 0$

$(2x-5)(x+4)=0$

$x = \frac{5}{2}, -4$

-40

$1, -8$

$2, -4$

6) (6 points) **Section 4.6** Solve the equation given below by "*completing the square*".

$3x^2 - 12x + 7 = 0$

$\frac{3x^2}{3} - \frac{12x}{3} = -\frac{7}{3}$

$x^2 - 4x = -\frac{7}{3}$

$+4 \qquad +\frac{12}{3}$

$(x-2)^2 = \frac{5}{3}$

$\sqrt{(x-2)^2} = \pm\sqrt{\frac{5}{3}}$

$x - 2 = \pm\sqrt{\frac{5}{3}}$

$x = 2 \pm \sqrt{\frac{5}{3}}$

$$x = 2 \pm \frac{\sqrt{15}}{3}$$

7) (5 points) **Section 4.7** Solve the equation given below by using the *Quadratic Formula*.

$5x^2 + 8x - 10 = 1$

$5x^2 + 8x - 11 = 0$

$a = 5 \quad b = 8 \quad c = -11$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(5)(-11)}}{2(5)}$$

$$x = \frac{-8 \pm \sqrt{64 + 220}}{10}$$

$$x = \frac{-8 \pm \sqrt{284}}{10} = \frac{-8 \pm 2\sqrt{71}}{10}$$

$$= \frac{-4 \pm \sqrt{71}}{5}$$

8) (6 points) **Section 4.8** Complete the operations given below and graph your result to part a)

a) $(2-4i)+(-3+5i)$

b) $(3-9i)-(2-8i)$

c) $(3-2i)(2-5i)$

d) $\frac{1-i}{5-6i}$

e) $|2-5i|$

a) $(2-4i)+(-3+5i)$

$2-4i-3+5i = \boxed{-1+i}$

b) $(3-9i)-(2-8i)$

$3-9i-2+8i = \boxed{1-i}$

c) $(3-2i)(2-5i)$

FOIL $6-15i-4i+10i^2$

$6-19i+10(-1)$

$6-19i-10$

$\boxed{= -4-19i}$

d) $\frac{1-i}{5-6i}$

$\frac{1-i}{5-6i} \cdot \frac{5+6i}{5+6i} = \frac{5+6i-5i-6i^2}{25+30i-30i-36i^2}$

MULTIPLY BY THE CONJUGATE OF DENOM

$= \frac{5+i+6}{25+36}$

$\boxed{= \frac{11+i}{61}}$

e) $|2-5i| = \sqrt{2^2+5^2}$

$= \sqrt{4+25} = \boxed{\sqrt{29}}$

9) (6 points) **Section 4.9** Solve the system of equations given below.

$$y = 2x^2 + 2x + 1$$
$$y = 3x + 4$$

SUBSTITUTION

$2x^2 + 2x + 1 = 3x + 4$

$2x^2 - x - 3 = 0$

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

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

IF $x = \frac{3}{2}$

$y = 3(\frac{3}{2}) + 4$

$= \frac{9}{2} + \frac{8}{2} = \frac{17}{2}$

IF $x = -1$

$y = 3(-1) + 4$

$= -3 + 4 = 1$

$\left(\frac{3}{2}, \frac{17}{2}\right)$ $(-1, 1)$