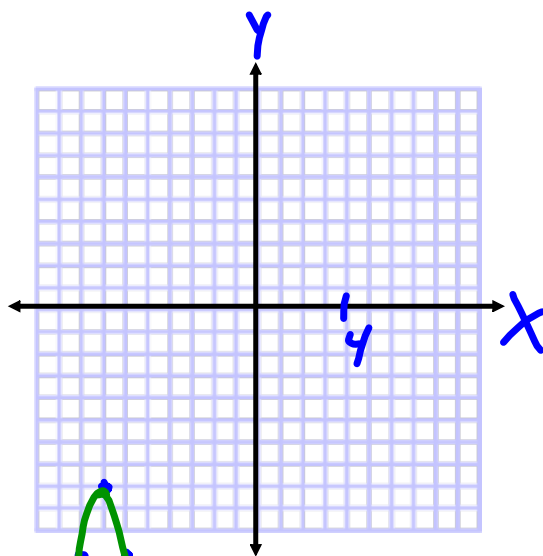
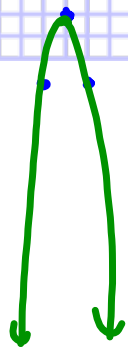


1) (5 points) **Section 4.1** Graph the function using translations. Find the vertex, the extreme value (Maximum or Minimum), and the Axis of Symmetry. Give the Domain and Range of the function.

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



7 LEFT
8 DOWN
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.

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

$$= \frac{5}{4}$$

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

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

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

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

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

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

OR

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

$$- \frac{25}{8}$$

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

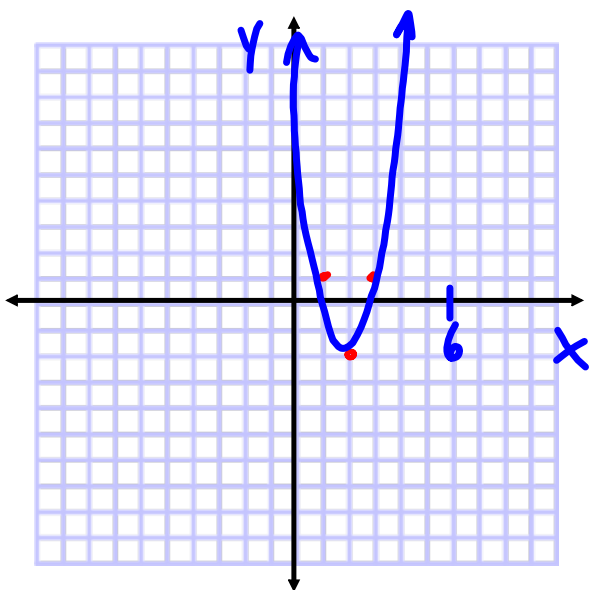
$$V: \left(\frac{5}{4}, \frac{71}{8}\right)$$

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.

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

$$y = 3(x^2 - 4x + 4) + 10 - 12$$

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



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) $12y^2 - 75$

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

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

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

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

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

$$\begin{array}{r} 48 \\ \hline -16 \quad 2 \quad -8 \\ -3 \quad 1 \quad -3 \\ \hline -19 \end{array}$$

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

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

$$2x^2 + 3x - 20 = 0$$
$$(2x - 5)(x + 4) = 0$$

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

$$\begin{array}{r} -40 \\ 2 \overline{) 80} \\ \underline{40} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

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

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

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

$$x^2 - 4x = -\frac{7}{3} + \frac{12}{3}$$

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

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

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

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

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

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

$$5x^2 + 8x - 11 = 1$$

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

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

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

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

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

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

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

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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) $|2 - 5i|$

$$\begin{aligned} a) \quad (2 - 4i) + (-3 + 5i) \\ 2 - 4i - 3 + 5i &= -1 + i \end{aligned}$$

$$\begin{aligned} b) \quad (3 - 9i) - (2 - 8i) \\ 3 - 9i - 2 + 8i &= 1 - i \end{aligned}$$

$$\begin{aligned} c) \quad (3 - 2i)(2 - 5i) \\ \text{FOIL} \quad 6 - 15i - 4i + 10i^2 \\ 6 - 19i + 10(-1) \\ 6 - 19i - 10 &= -4 - 19i \end{aligned}$$

$$\begin{aligned} d) \quad \frac{1-i}{5-6i} \\ \frac{1-i}{5-6i} \cdot \frac{5+6i}{5+6i} &= \frac{5+6i-5i-6i^2}{25+\cancel{30i}-\cancel{30i}-36i^2} \\ &= \frac{5+i+6}{25+36} \\ &= \frac{11+i}{61} \end{aligned}$$

MULTIPLY BY THE CONJUGATE OF DENOM

$$\begin{aligned} e) \quad |2 - 5i| &= \sqrt{2^2 + 5^2} \\ &= \sqrt{4 + 25} = \sqrt{29} \end{aligned}$$

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

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

$$y = 3x + 4$$

SUBSTITUTION

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

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

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

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

$$\text{If } x = \frac{3}{2}$$

$$\begin{aligned} y &= 3\left(\frac{3}{2}\right) + 4 \\ &= \frac{9}{2} + \frac{8}{2} = \frac{17}{2} \end{aligned}$$

$$\text{If } x = -1$$

$$\begin{aligned} y &= 3(-1) + 4 \\ &= -3 + 4 = 1 \end{aligned}$$

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

$$(-1, 1)$$