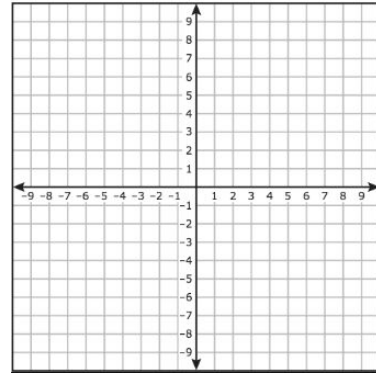


b) $2x^2 + 12x + 17$



4.) (20 pts total, 5 pts each) Factor each expression.

a) $x^2 + 5x - 14$

b) $x^2 + 7x + 12$

$\oplus \rightarrow$ same sign
 $\ominus \rightarrow$ different

c) $2x^2 - 13x + 15$

Factors of $2x^2$: $2x \cdot x$
 Factors of 15: $3 \cdot 5$ or $5 \cdot 3$
 $1 \cdot 15$ or $15 \cdot 1$

~~$2x - 5$
 3
 $2x^2 - 5x - 6x + 15$
 $-6x + (-5x) = -11x$~~

$2x - 3$
 5
 $2x^2 - 3x - 10x + 15$
 $-3x + (-10x) = -13x$

$(2x-3)(x-5)$

Larger \ominus different

d) $3x^2 - 5x - 12$

factors $3x^2$ factors -12

$3x \cdot x$ $2 \cdot 6$ $4 \cdot 3$ $1 \cdot 12$

$3x - 6$ $3x + 4$

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

$6x - 12$ $-9x - 12$

$6x - 6x = 0$ $-9x + 4x = -5x$

$18x - 2x = 16x$

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

5.) (10 pts total, 2.5 pts each) Evaluate the discriminant of the equation. Indicate the number of real roots for each.

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

$a=1$ $b=-4$ $c=4$ 1 real

$b^2 - 4ac = (-4)^2 - 4(1)(4)$
 $16 - 16 = 0$

Quadratic formula

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

discriminant

b) $-2x^2 + 6x - 14$

$a=-2$ $b=6$ $c=-14$

$b^2 - 4ac = (6)^2 - 4(-2)(-14)$
 $36 - 112 = -76$

0 reals

\oplus $b^2 - 4ac > 0$
 2 reals

\ominus $b^2 - 4ac = 0$
 1 real

\ominus $b^2 - 4ac < 0$
 0 reals

d) $2x^2 + 11x - 21$

6.) (15 pts total, 7.5 pts each) Solve using the Quadratic Equation.

a) $x^2 = 3x + 2$
 $-3x - 2 \quad -3x - 2$
 $x^2 - 3x - 2 = 0$
 $a = 1 \quad b = -3 \quad c = -2$

Formula
$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-2)}}{2(1)}$$

$$\frac{3 \pm \sqrt{9 + 8}}{2} = \boxed{\frac{3 \pm \sqrt{17}}{2}}$$

b) $3x^2 - 5x = -12$

7.) (15 pts total, 7.5 pts each) Place each equation in vertex form by completing the square. Please show all your work.

a) $x^2 = 5x + 14$

1.) 2020 it
 2.) Factor out a
 3.) $(\frac{b}{2})^2$
 4.) Square roots

b) $(2x^2 + 6x) - 7 = 0$

$2(x^2 + 3x) - 7 = 0$

$(\frac{3}{2})^2 = \frac{9}{4}$ $\frac{9}{4}$ $-\frac{9(2)}{4} = -\frac{18}{4}$

$2(x^2 + 3x + \frac{9}{4}) - 7 - \frac{18}{4} = 0$

$2(x^2 + 3x + \frac{9}{4}) - \frac{23}{2} = 0$

vertex form $\rightarrow 2(x + \frac{3}{2})^2 - \frac{23}{2} = 0$ vertex: $(-\frac{3}{2}, -\frac{23}{2})$

8.) (20 pts total, 10 pts each) Graph each equation completely. Plot all roots, intercepts, and the vertex.

a) $(x^2 + 6x) + 9$ y-int

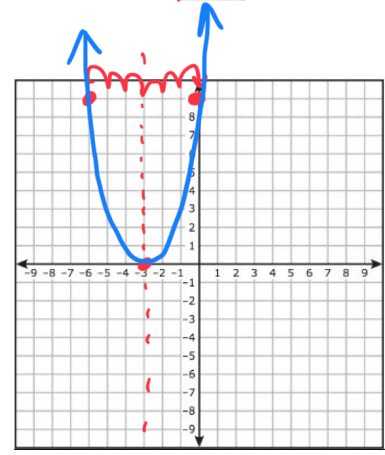
$(\frac{6}{2})^2 + 9 - 9$

$(\frac{6}{2})^2 (x^2 + 6x + 9) + 9 - 9$

$3^2 = 9$ $(x^2 + 6x + 9) + 0$

$(x + 3)^2 + 0$ Vertex: $(-3, 0)$

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



b) $x^2 - 4x - 5$

