MTH-PC College Algebra Session 10 10/12

First - Isolate the absolute value

$$|2x-8| + 5 \geq 13$$
$$\quad -5 \qquad -5$$
$$|2x-8| \geq 8$$

flip negative

$$2x - 8 \geq 8 \qquad\qquad 2x - 8 \leq -8$$
$$+8 \quad +8 \qquad\qquad +8 \quad +8$$
$$\frac{2x}{2} \geq \frac{16}{2} \qquad\qquad \frac{2x}{2} \leq \frac{0}{2}$$
$$x \geq 8 \qquad\qquad x \leq 0$$

Interval Notation:

$$\boxed{(-\infty, 0] \cup [8, \infty)}$$

$\{ \quad \}$

$$|x+7| + 8 < 3$$
$$\quad -8 \qquad -8$$
$$|x+7| < -5$$

$\boxed{\text{No solution}}$

$$|x+7| - 9 > -12$$
$$\quad +9 \qquad +9$$
$$|x+7| > -3$$

All Real numbers

$\mathbb{R}$ $(-\infty, \infty)$

$$|2a+3| > 7$$

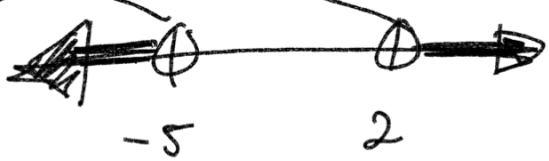
$$2a+3 > 7 \qquad\qquad 2a+3 < -7$$

$$-3 \quad -3 \qquad\qquad -3 \quad -3$$

$$\frac{2a}{2} > \frac{4}{2} \qquad\qquad \frac{2a}{2} < \frac{-10}{2}$$

$$a > 2 \qquad\qquad a < -5$$

$$(-\infty, -5) \cup (2, \infty)$$



Pre-Calculus Chapter 0 Pre-Test

Each question is worth 4 points each. Please show all work. Partial credit will be awarded for partially credit responses.

Solve for the indicated variable.

1.) $8x + 14 = 5x - 22$

2.) $6(2y - 1) = 3(5y + 2)$

3.) $\frac{m}{4} = \frac{m}{20} + 16$

4.) $12\left(\frac{5a}{6} - a = \frac{a}{4} - \frac{5}{2}\right)$

Multiply by LCM

LCM = 12

$\frac{60a}{6} - 12a = \frac{12a}{4} - \frac{60}{2}$

$10a - 12a = 3a - 30$

$-2a = 3a - 30$

$-3a \quad -3a$

$\frac{-5a}{-5} = \frac{-30}{-5}$

$\boxed{a = 6}$

Solve by factoring.

5.) $x^2 - 6x + 8 = 0$

Quadratic Formula

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

6.) $3x^2 - 2x - 16 = 0$

$a = 3$

$b = -2$

$c = -16$

$$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-16)}}{2(3)}$$

$$\frac{2 \pm \sqrt{4 + 192}}{6} = \frac{2 \pm \sqrt{196}}{6}$$

$$\frac{2 \pm 14}{6}$$

$$\frac{2+14}{6} = \frac{16}{6} \quad \boxed{\frac{8}{3}}$$

$$\frac{2-14}{6} = \frac{-12}{6} \quad \boxed{-2}$$

7.) $9y^2 = 36y$

$$\frac{9y^2}{9} = \frac{36y}{9}$$

$$\cancel{\frac{y^2}{y} = \frac{4y}{y}}$$

$$\boxed{y = 4}$$

$$y^2 = 4y$$
$$-4y \quad -4y$$

$$y^2 - 4y = 0$$

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

$$\boxed{y = 0}$$

$$y - 4 = 0$$
$$+4 \quad +4$$

$$\boxed{y = 4}$$

8.) $5a^2 = 25a - 20$

$\sqrt{(x-4)^2} = ((x-4)^2)^{\frac{1}{2}}$

Solve using the square root method.

9.) $(x - 4)^2 = 64$

$\sqrt{(x-4)^2} = \sqrt{64}$

or

$(x-4)(x-4) = 64$

$x^2 - 8x + 16 = 64$

$-64 \quad -64$

$x^2 - 8x - 48$

$x - 4 = \pm 8$

$+4 \quad +4$

$x = \pm 8 + 4$

$8 + 4 = \boxed{12}$

$-8 + 4 = \boxed{-4}$

Find vertex by completing the square. Graph.

10.) $x^2 - 4x = -10$

$+10 \quad +10$

$x^2 - 4x + 10 = 0$

$x^2 - 4x + 10$ y-int

$(x^2 - 4x) + 10 = 0$

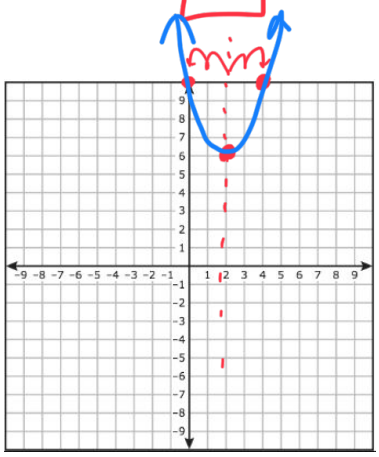
$\left(\frac{b}{2}\right)^2 \left(\frac{-4}{2}\right)^2 = +4 \quad -4$

$(x^2 - 4x + 4) + 6 = 0$

$\sqrt{x^2} \quad \sqrt{4}$

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

vertex: $(2,6)$



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

$-6 \quad -6$

$\sqrt{(x-2)^2} = \sqrt{-6}$

$x - 2 = \pm\sqrt{-6}$

No roots!

Solve by using the quadratic formula.

11.) $4x^2 - 2x + 11 = 0$

Specify any values that must be excluded from the solution set and then solve the rational equation.

12.) $\frac{3}{w+4} + \frac{1}{w} = \frac{w^2}{w(w+4)}$ common denominator

$w(w+4) \neq 0$

$\boxed{w \neq 0}$ $w+4 \neq 0$

$-4 \quad -4$

$\boxed{w \neq -4}$

$\frac{w}{w}\left(\frac{3}{w+4}\right) + \left(\frac{1}{w}\right)\frac{w+4}{w+4} = \frac{w^2}{w(w+4)}$

$3w + w + 4 = w^2$

$4w + 4 = w^2$

$-4w - 4 \quad -4w - 4$

$w^2 - 4w - 4 = 0$

$\cancel{-x = -4}$

$\cancel{-+x = -4}$

$\sqrt{32}$

$\sqrt{16} * \sqrt{2}$

$4\sqrt{2}$

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

$\frac{4 \pm \sqrt{16 - 4(1)(-4)}}{2} = \frac{4 \pm \sqrt{32}}{2} = \frac{4 \pm 4\sqrt{2}}{2} = \boxed{2 \pm 2\sqrt{2}}$

Solve the radical equation for the given variable.

13.) $\frac{4(t + 3)^{2/3}}{4} = \frac{16}{4}$

$\left((t+3)^{2/3}\right)^{3/2} = (4)^{3/2}$

$t + 3 = 4^{3/2}$

$4^{3/2} = \sqrt{4^3}$

$\sqrt{64} = \boxed{\pm 8}$

$4^{3/2} = (\sqrt{4})^3$

$(\pm 2)^3 = \boxed{\pm 8}$

$t + 3 = \pm 8$

$-3 \quad -3$

$\boxed{t = \pm 8 - 3}$

14.) $(\sqrt{2x + 8})^2 = (x - 8)^2$

$2x + 8 = (x-8)^2$

$2x + 8 = (x-8)(x-8)$

$2x + 8 = x^2 - 16x + 64$

Another quadratic

Solve either through u substitution or factoring.

15.) $3t^{2/3} - t^{1/3} - 2 = 0$

16.) $(x - 2)^4 - 8(x - 2)^2 + 16 = 0$

$u = (x-2)^2$

$u^2 - 8u + 16 = 0$

$(u-4)(u-4) = 0$

$u = 4$

$\sqrt{4} = \sqrt{(x-2)^2}$

$\pm 2 = x - 2$

$+2 \quad +2$

$x = \pm 2 + 2$

$4, 0$

Solve the absolute value equation.

17.) $|2x - 3| = 11$

18.) $2|3x - 6| - 12 = -6$

Rewrite in interval notation and graph.

19.) $-3 < x \leq 9$

$-3 < x$

$x > -3$

$x \leq 9$

$(-3, 9]$

Solve each linear inequality and express the solution set in interval notation.

20.) $-11 \leq -2x + 3 < -3$

$-3 \quad -3 \quad -3$

$\frac{-14}{-2} \leq \frac{-2x}{-2} < \frac{-6}{-2}$

Flip!

$7 \geq x > 3$

$(3, 7]$

21.) $x^2 - 2x - 35 \geq 0$

w/quadratic formula

22.) $-17x + 5 > 6x^2$

Solve each rational inequality and express the solution set in interval notation.

23.) $\frac{x^2 - 36}{x + 6} \geq 0$

24.) $\frac{2t^2}{t - 3} \geq -t$

Solve the absolute value inequality and express the solution set in interval notation.

25.) $|x + 2| < 5$