Key

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

$-5x \quad -5x$

$3x + 14 = -22$

$-14 \quad -14$

$\frac{3x}{3} = \frac{-36}{3}$

$\boxed{x = -12}$

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

$12y - 6 = 15y + 6$

$-12y \quad -12y$

$-6 = 3y + 6$

$-6 \quad -6$

$\frac{-12}{3} = \frac{3y}{3}$

$\boxed{y = -4}$

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

$\frac{20m}{4} = \frac{20m}{20} + 320$

$5m = m + 320$

$-m \quad -m$

$\frac{4m}{4} = \frac{320}{4}$

$\boxed{m = 80}$

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

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

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

$-2a = 3a - 30$

$-3a \quad -3a$

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

$\boxed{a = 6}$

Solve by factoring.

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

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

$x-4=0$ $\quad$ $x-2=0$

$+4\ +4$ $\quad$ $+2\ +2$

$\boxed{x=4}$ $\quad$ $\boxed{x=2}$

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

$(3x-8)(x+2)=0$

$3x-8=0$ $\quad$ $x+2=0$

$+8\ +8$ $\quad$ $-2\ -2$

$\frac{3x}{3}=\frac{8}{3}$ $\quad$ $x=-2$

$\boxed{x=\frac{8}{3}}$ $\quad$ $\boxed{x=-2}$

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

$-36y\ -36y$

$9y^2-36y=0$

$9y(y-4)=0$

$\frac{9y}{9}=\frac{0}{9}$ $\quad$ $y-4=0$

$+4\ +4$

$\boxed{y=0}$ $\quad$ $\boxed{y=4}$

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

$-25a+20\ -25a+20$

$5a^2-25a+20=0$

$5(a^2-5a+4)=0$

$5(a-1)(a-4)=0$

$a-1=0$

$+1\ +1$

$a-4=0$

$+4\ +4$

$\boxed{a=1}$ $\quad$ $\boxed{a=4}$

Solve using the square root method.

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

$x - 4 = \pm 8$

$x - 4 = 8$ $\quad$ $x - 4 = -8$

$+4 \quad +4$ $\quad$ $+4 \quad +4$

$x = 12$ $\quad$ $x = -4$

Find vertex by completing the square. Graph.

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

$+10 \quad +10$

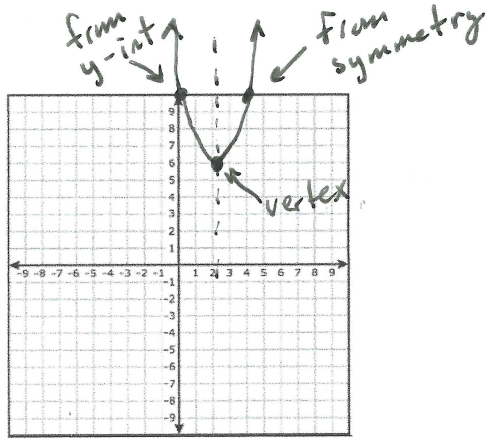
$\left(\frac{-4}{2}\right)^2 = 4$

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

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

$(x-2)^2 + 6$

vertex: (2,6)



Solve by using the quadratic formula.

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

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

$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(4)(11)}}{2(4)}$

$\frac{2 \pm \sqrt{4 - 176}}{8}$

$\frac{2 \pm \sqrt{-172}}{8}$

$\frac{2 \pm \sqrt{-4 \cdot 43}}{8}$

$\frac{2 \pm 2i\sqrt{43}}{8}$

$\frac{1 \pm i\sqrt{43}}{4}$

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

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

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

Once the denominators are the same, they cancel.

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

$4w + 4 = w^2$

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

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

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

$\frac{4 \pm \sqrt{16+16}}{2}$

$\frac{4 \pm \sqrt{32}}{2}$ $\quad \frac{4 \pm 4\sqrt{2}}{2}$

$2 \pm 2\sqrt{2}$

Solve the radical equation for the given variable.

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

$\frac{4}{4} \quad \frac{16}{4}$

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

$t + 3 = \pm 2^3$

$t + 3 = 8$

$-3 \quad -3$

$t = 5$

$t + 3 = (-2)^3$

$t + 3 = -8$

$-3 \quad -3$

$t = -11$

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

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

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

$-2x \quad -8 \qquad -2x \quad -8$

$0 = x^2 - 18x + 56$

$(x-14)(x-4) = 0$

$x - 14 = 0$ $\quad x - 4 = 0$

$+14 \quad +14 \qquad +4 \quad +4$

$x = 14 \qquad x = 4$

Note: Since we have $\sqrt{2x+8}$

For all solutions,

$2x + 8 \geq 0$

$-8 \quad -8$

$\frac{2x}{2} \geq \frac{-8}{2}$

$x \geq -4$

Solve either through u substitution or factoring.

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

$u = t^{\frac{1}{3}}$

$3u^2 - u - 2 = 0$

$(t^{\frac{1}{3}})^3 = (-\frac{2}{3})^3 \quad (t^{\frac{1}{3}})^3 = (1)^3$

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

$t = 1$

$-\frac{2}{3} \cdot -\frac{2}{3} \cdot -\frac{2}{3}$

$3u + 2 = 0 \quad u - 1 = 0$

$-2 \quad -2 \quad +1 \quad +1$

$\frac{-8}{27} = t$

$\frac{3u}{3} = \frac{-2}{3} \quad u = \frac{-2}{3} \quad u = 1$

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

$u = (x-2)^2$

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

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

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

$x - 2 = \pm 2$

$x - 2 = 2 \quad x - 2 = -2$

$+2 \quad +2 \quad +2 \quad +2$

$u - 4 = 0 \quad u = 4$

$+4 \quad +4$

$x = 4 \quad x = 0$

Solve the absolute value equation.

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

$2x - 3 = 11 \qquad 2x - 3 = -11$

$+3 \quad +3 \qquad +3 \quad +3$

$\frac{2x}{2} = \frac{14}{2} \qquad \frac{2x}{2} = \frac{-8}{2}$

$x = 7 \qquad x = -4$

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

$+12 \quad +12$

$\frac{2|3x-6|}{2} = \frac{6}{2}$

$|3x-6| = 3$

$3x-6 = 3 \qquad 3x-6 = -3$

$+6 \quad +6 \qquad +6 \quad +6$

$\frac{3x}{3} = \frac{9}{3} \qquad \frac{3x}{3} = \frac{3}{3}$

$x = 3 \qquad x = 1$

Rewrite in interval notation and graph.

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

$-3 < x \qquad x \leq 9$

$(-3, 9]$

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

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

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

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

$7 \geq x > 3$

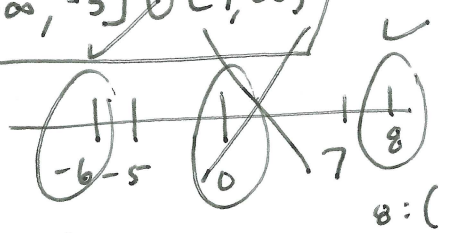
$(3, 7]$

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

POSITIVE

$(x-7)(x+5) \geq 0$

$(-\infty, -5] \cup [7, \infty)$



$x-7=0 \qquad x+5=0$

$+7 \quad +7 \qquad -5 \quad -5$

$x=7 \qquad x=5$

$-6: (-6-7)(-6+5) \geq 0$

$(-)(-) \geq 0$

$(+) \geq 0$ true

$0: (0-7)(0+5) \geq 0$

$(-)(+) \geq 0$

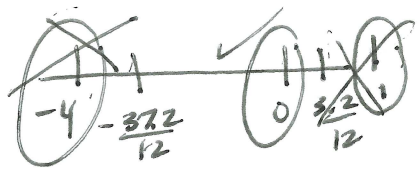
$(-) \geq 0$ false

$8: (8-7)(8+5) \geq 0$

$(+)(+) \geq 0$

true

Not pretty... :\



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

$+17x \quad -5 \quad +17x - 5$

NEGATIVE $0 > 6x^2 + 17x - 5$

$\frac{-17 + 20.2}{12}$ $\quad$ $\frac{-17 - 20.2}{12}$

$\frac{3.2}{12}$ $\quad$ $\frac{-37.2}{12}$

$-17 \pm \sqrt{(17)^2 - 4(6)(-5)}$ / $2(6)$

$\frac{-17 \pm \sqrt{289 + 120}}{12}$ $\quad$ $\frac{-17 + \sqrt{409}}{12}$

$\frac{-17 \pm \sqrt{409}}{12}$ $\quad$ $\frac{-17 - \sqrt{409}}{12}$

$\left(\frac{-17-\sqrt{409}}{12}, \frac{-17+\sqrt{409}}{12}\right)$

$0 > 6(-4)^2 + 17(-4) - 5$

$0 > 6(16) - 68 - 5$

$0 > 96 - 68 - 5$

$0 > 23$ false

$0 > 6(0)^2 + 17(0) - 5$

$0 > -5$ true

$0 > 6(1)^2 + 17(1) - 5$

$0 > 6 + 17 - 5$

$0 > +18$ false

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

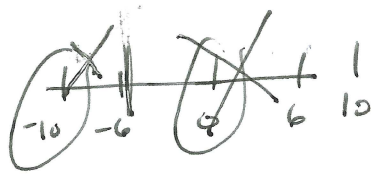
23.) $\frac{x^2 - 36}{x + 6} \geq 0$

$x - 6 = 0$ $\quad +6 \; +6$

$x + 6 \neq 0$ $\quad -6 \; -6$

$x \neq -6$

POSITIVE $\frac{(x-6)(x+6)}{(x+6)} \geq 0$



$\frac{(-10-6)(-10+6)}{-10+6} \geq 0$ $\quad \frac{(-)(-)}{(-)} \geq 0$ $\quad (-) \geq 0$ false

$\frac{(0-6)(0+6)}{(0+6)}$ $\quad \frac{(-)(+)}{(+)} \geq 0$ $\quad -\geq 0$ false!

$\frac{(10-6)(10+6)}{10+6}$ $\quad \frac{(+)(+)}{(+)} \geq 0$ true!

$[6, \infty)$

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

$+t \quad +t$

POSITIVE $\frac{2t^2}{t-3} + t \geq 0$

$\frac{2t^2}{t-3} + \frac{t(t-3)}{t-3} \geq 0$

$\frac{2t^2 + t^2 - 3t}{t-3} \geq 0$

$\frac{3t^2 - 3t}{t-3} \geq 0$

$\frac{3t(t-1)}{t-3} \geq 0$

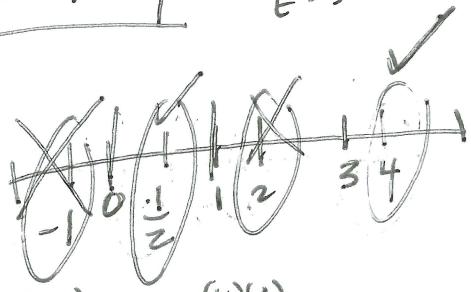
$t - 1 = 0$ $\quad +1 \; +1$ $\quad t = 1$

$t - 3 = 0$ $\quad +3 \; +3$

$\frac{3t}{3} = \frac{0}{3}$ $\quad t = 0$ $\quad t = 3$

$\frac{3(4)(4-1)}{(4-3)}$ $\quad \frac{(+)(+)}{(+)} \geq 0$ $\quad + \geq 0$ true!

$[0, 1] \cup (3, \infty)$



$\frac{3(2)(2-1)}{2-3} \geq 0$ $\quad \frac{(+)(+)}{(-)} \geq 0$ $\quad (-) \geq 0$ false

$\frac{3(-1)(-1-1)}{-1-3}$ $\quad \frac{(-)(-)}{-} \geq 0$ $\quad (-) \geq 0$ false

$\frac{3(\frac{1}{2})(\frac{1}{2}-1)}{(\frac{1}{2}-3)}$ $\quad \frac{(+)(-)}{(-)} \geq 0$ $\quad (+) \geq 0$ true

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

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

$x + 2 < 5$
$-2 \quad -2$
$x < 3$

$x + 2 > -5$
$-2 \quad -2$
$x > -7$

$(-7, 3)$