

Show all relevant work and indicate your final answers. Each question (including each part part) is worth 5 points.

1. Solve for x . Indicate all extraneous solutions.

a. $3x^2 = 12x$

$$x^2 = 4x$$

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

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

$$x = 0 \text{ or } x = 4$$

b. $4x^3 - 6x^2 - 20x + 30 = 0$

$$2x^2(2x-3) - 10(2x-3) = 0$$

$$(2x^2 - 10)(2x - 3) = 0$$

$$2x^2 - 10 = 0 \text{ or } 2x - 3 = 0$$

$$x^2 - 5 = 0$$

$$x = \pm\sqrt{5}$$

$$x = 1.5$$

c. $\sqrt{x+7} - x = -5$

$$\sqrt{x+7} = x-5$$

$$x+7 = (x-5)^2$$

$$x+7 = x^2 - 10x + 25$$

$$x^2 - 11x + 18 = 0$$

$$(x-9)(x-2) = 0$$

$$x = 9 \text{ or } x = 2$$

Check:

$$x = 9$$

$$x = 2 \rightarrow$$

\rightarrow is not a solution

d. $\frac{x}{x+3} + 2 = \frac{3}{2x-1}$

$$x \neq -3 \quad x \neq \frac{1}{2}$$

$$\frac{x}{x+3} + \frac{2(x+3)}{x+3} = \frac{3}{2x-1}$$

$$\frac{x+2x+6}{x+3} = \frac{3}{2x-1}$$

$$\frac{3x+6}{x+3} = \frac{3}{2x-1}$$

$$(3x+6)(2x-1) = 3x+9$$

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

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

$$x = \frac{-2 \pm \sqrt{44}}{2}$$

$$= \frac{-1 \pm \sqrt{11}}{1}$$

2. Solve the following inequalities. Express your answers in interval notation.

a. $2|x-14| + 7 < 15$

$$2|x-14| < 8$$

$$|x-14| < 4$$

$$-4 < x-14 < 4$$

$$10 < x < 18$$

$$(10, 18)$$

b. $\left| \frac{x-2}{4} \right| > 3$

$$\frac{x-2}{4} > 3 \text{ or } \frac{x-2}{4} < -3$$

$$x-2 > 12 \text{ or } x-2 < -12$$

$$x > 14 \text{ or } x < -10$$

$$(-\infty, -10) \cup (14, \infty)$$

3. Write an inequality to represent the following statement:

A pilot is instructed to keep her plane at an altitude of over 29,000 feet but not to exceed 31,000 feet.

$$29000 < x \leq 31000$$

4. Let A (-4, 1) and B (-6, 0) be two points. Find

a. The distance between points A and B.

$$\begin{aligned} &= \sqrt{(-6+4)^2 + (0-1)^2} \\ &= \sqrt{4+1} \\ &= \sqrt{5} \end{aligned}$$

b. Find the midpoint of the line segment AB.

$$\begin{aligned} &\left(\frac{-4-6}{2}, \frac{1+0}{2} \right) \\ &= (-5, .5) \end{aligned}$$

5. Given the linear equation $-3y + 4x = 6$, find

a. x-intercept(s): $y = 0$

$$\begin{aligned} 4x &= 6 \\ x &= \frac{3}{2} \\ &= 1.5 \\ (1.5, 0) \end{aligned}$$

b. y-intercept(s): $x = 0$

$$\begin{aligned} -3y &= 6 \\ y &= -2 \\ (0, -2) \end{aligned}$$

6. Let $f(x) = -2x^2 + 4x$, find

a. $f(-3)$.

$$\begin{aligned} &= -2(-3)^2 + 4(-3) \\ &= -2(9) - 12 \\ &= -18 - 12 \\ &= -30 \end{aligned}$$

b. State the domain of f .

$$(-\infty, \infty)$$

7. If $f(x) = 2x^2 + x$, find the average rate of change from $x_1 = 0$ to $x_2 = 2$.

$$\begin{aligned} \frac{f(2) - f(0)}{2} &= \frac{2[4] + 2 - [0 + 0]}{2} \\ &= \frac{10}{2} \\ &= 5 \end{aligned}$$

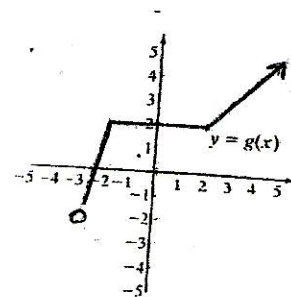
8. Refer to the following graph to answer (a) - (b). Write in interval form

a. The domain

$$(-3, \infty)$$

b. The range.

$$(-2, \infty)$$



9. Write the equation of the line that passes through the points $(-3, -2)$ and $(-1, 4)$. Express your answer in slope-intercept form.

$$m = \frac{4 - (-2)}{-1 - (-3)} = \frac{6}{2} = 3$$

Equation of the line with slope 3 and thro' $(-3, -2)$ is

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

$$y + 2 = 3x + 9$$

$$y = 3x + 7$$

10. Express the circle defined by $x^2 + y^2 + 12x - 14y + 84 = 0$ in standard form.

$$(x^2 + 12x) + (y^2 - 14y) = -84$$

$$(x^2 + 12x + 36) + (y^2 - 14y + 49) = 36 + 49 - 84$$

$$(x + 6)^2 + (y - 7)^2 = 1$$

$$(x - (-6))^2 + (y - 7)^2 = (1)^2$$

a. Find the circle's radius ; |

b. Find the circle's center.

$$(-6, 7)$$

11. The value V of a computer t years after it is purchased is $V = -300t + 1300$. When will its value reach \$100?

$$-300t + 1300 = 100$$

$$-300t = -1200$$

$$t = 4 \text{ years}$$