

Chapter 1.5-1.10 Review

Pre-Calculus

Name

Key

per. _____

Find all real solutions.

1. $3x^2 + 25x = -28$

$$3x^2 + 25x + 28 = 0$$

$$\begin{array}{r} 84 \\ 4 \times 21 \\ 25 \end{array} \quad (3x+21)(3x+4) = 0$$

$$(x+7)(3x+4) = 0$$

$$x = -7, -4/3$$

4. $x^3y - 4xy = 0$

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

$$x = 0, \pm 2$$

$$y = 0$$

7. $x + 5 = 14 - \frac{1}{2}x$

$$-9 = -\frac{3}{2}x$$

$$-9 \cdot \frac{2}{3} = x$$

$$x = 6$$

10. $x^4 - 3x^2 + 2 = 0$

$$x^2 = \frac{3 \pm \sqrt{(-3)^2 - 4(1)(2)}}{2(1)}$$

$$x^2 = \frac{3 \pm \sqrt{9-8}}{2}$$

$$x^2 = \frac{3 \pm 1}{2}$$

$$x^2 = 2, 1$$

$$x = \pm\sqrt{2}, \pm 1$$

2. $27x^3 = 64$

$$27x^3 - 64 = 0$$

$$(3x-4)(9x^2+12x+16) = 0$$

$$x = 4/3$$

$$\frac{-12 \pm \sqrt{12^2 - 4(9)(16)}}{2(9)} \text{ not real}$$

5. $(a^2 + 1)^2 - 12(a^2 + 1) = -20$

$$u = a^2 + 1$$

$$u^2 - 12u + 20 = 0$$

$$(u-10)(u-2) = 0$$

$$(a^2+1-10)(a^2+1-2) = 0$$

$$(a^2-9)(a^2-1) = 0$$

$$a = \pm 3, \pm 1$$

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

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

$$x^2 - 3 = 2x^2 + 2x - 3x - 3$$

$$0 = x^2 - 1x$$

$$0 = x(x-1)$$

$$x = 0, 1$$

11. $3|x-4| = 10$

$$|x-4| = \frac{10}{3}$$

$$x-4 = \frac{10}{3} \quad x-4 = -\frac{10}{3}$$

$$x = \frac{22}{3} \quad x = \frac{2}{3}$$

3. $x^3 - 3x^2 = 4x - 12$

$$(x^3 - 3x^2) - (4x - 12) = 0$$

$$x^2(x-3) - 4(x-3) = 0$$

$$(x^2-4)(x-3) = 0$$

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

$$x = \pm 2, 3$$

6. $x^{\frac{1}{2}} + 3x^{-\frac{1}{2}} = 10x^{\frac{3}{2}}$

$$x^{1/2} + 3x^{-1/2} - 10x^{3/2} = 0$$

$$x^{-3/2}(x^2 + 3x - 10) = 0$$

$$x^{-3/2}(x+5)(x-2) = 0$$

$$x = -5, 2, 0$$

9. $x^2 - x - 12 = 0$

$$(x-4)(x+3) = 0$$

$$x = 4, -3$$

12. $2x = 2 - \sqrt{6-x}$

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

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

$$4x^2 - 8x + 4 = 6-x$$

$$4x^2 - 7x - 2 = 0$$

$$(4x+1)(x-2) = 0$$

$$4x = -1 \quad x = 2$$

$$x = -1/4$$

Word Problems.

12. Find three consecutive integers whose sum is 360.

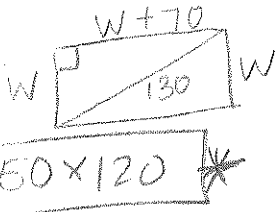
$$n + n + 1 + n + 2 = 360$$

$$3n + 3 = 360$$

$$3n = 357$$

$$n = 119, 120, 121$$

14. A rectangular parcel of land is 70 ft longer than it is wide. Each diagonal between opposite corners is 130 ft. What are the dimensions of the parcel?



$$W^2 + (W + 70)^2 = 130^2$$

$$W^2 + W^2 + 140W + 4900 = 16900$$

$$2W^2 + 140W - 12000 = 0$$

$$2(W^2 + 70W - 6000) = 0$$

$$X = \frac{-70 \pm \sqrt{70^2 - 4(1)(-6000)}}{2(1)} = \frac{-70 \pm \sqrt{28900}}{2} = \frac{-70 \pm 170}{2} \quad X = 50$$

$$\begin{matrix} W = 50 \\ L = 120 \end{matrix}$$

Solve each inequality. Write the answer using interval notation, and sketch the solution on the real number line.

16. $-4 < 5 - 3x \leq 17$

$$-9 < -3x \leq 12$$

$$3 > x \geq -4$$



19. $\frac{2x-3}{x+1} \leq 1$

$$\frac{2x-3}{x+1} - \frac{x+1}{x+1} \leq 0$$

$$\frac{2x-3-x-1}{x+1} \leq 0$$

$$\frac{x-4}{x+1} \leq 0$$



Describe and sketch the regions given by each set.

13. If Ben invests \$3000 at 4% interest per year, how much additional money must he invest at 5.5% annual interest to ensure that the interest he receives each year is 4.5% of the total amount invested?

$$.04(3000) + .055x = .045(3000 + x)$$

$$120 + .055x = 135 + .045x$$

$$.01x = 15$$

$$x = 1500$$

15. A large plywood box has a volume of 180 ft³. Its length is 9 ft greater than its height, and its width is 4 ft less than its height. What is the height of the box?

$$h(h+9)(h-4) = 180$$

$$h^3 + 5h^2 - 36h = 180$$

$$h^3 + 5h^2 - 36h - 180 = 0$$

$$h^2(h+5) - 36(h+5) = 0$$

$$(h+5)(h-6)(h+5) = 0$$

$$\begin{matrix} h = 6 \\ L = 15 \\ W = 2 \end{matrix}$$

17. $x^3 + x^2 > 2x$

$$x^3 + x^2 - 2x > 0$$

$$x(x^2 + x - 2) > 0$$

$$x(x-1)(x+2) > 0$$

$$x = 0, 1, -2$$



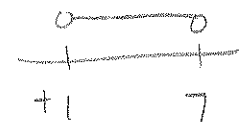
$$(-2, 0) \cup (1, \infty)$$

18. $|x - 4| < 3$

$$x - 4 < 3$$

$$x - 4 > -3$$

$$x < 7, x > 1$$



$$(1, 7)$$

Find the center and radius of each circle.

26. $x^2 + y^2 = 25$.

$(0,0) \quad r=5$

center: $(0,0)$
 $r: 5$

27. $(x-2)^2 + (y+1)^2 = 9$

center: $(2,-1)$
 radius: 3

28. $x^2 + 6x + y^2 - 2y + 6 = 0$

$x^2 + 6x + 9 + y^2 - 2y + 1 = -6 + 9 + 1$

$(x+3)^2 + (y-1)^2 = 4$

center: $(-3,1)$
 radius: 2

Find the equation of the circle.

29. Centered at $(-2,2)$; passes through $(0,2)$

$(0+2)^2 + (2-2)^2 = r^2$

$4 + 0 = r^2$

$r = 2$

$(x+2)^2 + (y-2)^2 = 4$

30. Centered at $(-1,1)$; passes through $(2,0)$

$(2+1)^2 + (0-1)^2 = r^2$

$9 + 1 = r^2$

$10 = r^2$

$(x+1)^2 + (y-1)^2 = 10$

Find an equation for the line with the given property.

31. It passes through the point $(3, -6)$ and is parallel to the line $3x + y - 10 = 0$.

$y = -3x + 10$

$-6 = -3(3) + b$

$-6 = -9 + b$

$3 = b$

$y = -3x + 3$

32. It has x-intercept 6 and y-intercept 4.

$(6,0); (0,4)$

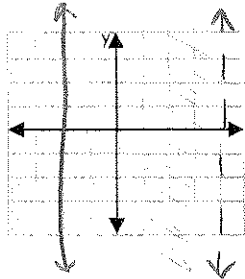
$\frac{4-0}{0-6} = \frac{4}{-6} = -2/3$

$y-0 = -\frac{2}{3}(x-6)$

$y = -\frac{2}{3}x + 4$

Describe and sketch the regions given by each set.

20. $\{(x, y) | -2 \leq x < 4\}$



23. Plot the points P(0, 3), Q(3, 0), and R(6, 3) in the coordinate plane.

a) Where must the point S be located so that PQRS is a square? (3, 6)

b) Find the area of PQRS

$$PQ = \sqrt{3^2 + 3^2} = \sqrt{18}$$

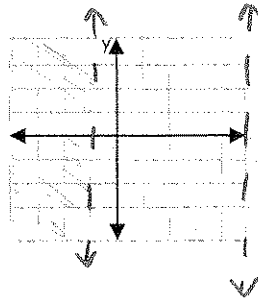
$$QR = \sqrt{18}$$

$$\text{area} = 18 \text{ units}^2$$

21. $\{(x, y) | |x - 2| > 3\}$

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

$$x > 5 \text{ or } x < -1$$



24. Let P(-3, 1) and Q(5, 6) be two points in the coordinate plane.

Plot P and Q in the coordinate plane.

Find the distance between P and Q. $\sqrt{8^2 + 5^2} = \sqrt{89}$

Find the midpoint of the segment PQ. $(\frac{-3+5}{2}, \frac{1+6}{2}) = (1, \frac{7}{2})$

Find the slope of the line that contains P and Q.

$$\frac{6-1}{5-(-3)} = \frac{5}{8}$$

Find the perpendicular bisector of the line that contains P and Q. pt $(1, \frac{7}{2})$ $m = -\frac{8}{5}$ $y = -\frac{8}{5}x + \frac{51}{10}$

Find an equation for the circle for which the segment PQ is the diameter. $C = (1, \frac{7}{2})$

$$r = \frac{\sqrt{89}}{2}$$

$$(x-1)^2 + (y-\frac{7}{2})^2 = \frac{89}{4}$$

25. Find the x and y intercepts of the graph of

a) $y = x^2 - 4$

x-int: set $y=0$ y-int:

$$0 = x^2 - 4$$

$$4 = x^2$$

$$\pm 2 = x$$

$$(-2, 0) \quad (0, -4) \quad (2, 0)$$

b) $y = \frac{2x}{x+1}$

x-int:

$$0 = \frac{2x}{x+1}$$

$$(0, 0)$$

y-int:

$$y = \frac{2(0)}{0+1} = 0$$

$$(0, 0)$$