

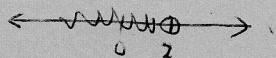
Final Review

Solve the compound inequality and graph the solution set:

1) $-2x + 5 > 7$ or $-3x + 10 > 2x$

$$-2x > 2 \quad -5x > -10$$

$$x < -2 \quad x < 2$$

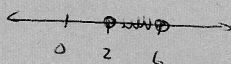


Solve the inequality and graph the solution set:

2) $|x - 4| \leq 2$

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

$$x = 6 \quad x = 2$$



Simplify

4) $\sqrt[4]{x} \cdot \sqrt[5]{x}$

$$x^{\frac{1}{4}} \cdot x^{\frac{1}{5}}$$

$$x^{\frac{5}{20} + \frac{4}{20}}$$

$$x^{\frac{9}{20}} \quad \sqrt[20]{x^9}$$

5) $\left(36x^{\frac{1}{2}}y^{-\frac{1}{4}}\right)^{\frac{1}{2}}$

$$6x^{\frac{1}{4}}y^{-\frac{1}{8}}$$

$$\frac{6x^{\frac{1}{4}}}{y^{\frac{1}{8}}}$$

6) $(5\sqrt{6} + 2\sqrt{2})(\sqrt{6} + \sqrt{2})$

$$5(6) + 5\sqrt{12} + 2\sqrt{12} + 2 \cdot 2$$

$$30 + 7\sqrt{12} + 4$$

$$34 + 7\sqrt{4 \cdot 3}$$

$$34 + 14\sqrt{3}$$

Solve the equation:

7) $7|5x| + 2 = 16$

$$7|5x| = 14$$

$$|5x| = 2$$

$$5x = 2 \text{ or } 5x = -2$$

$$x = \frac{2}{5} \text{ or } x = -\frac{2}{5}$$

8) $\frac{x+1}{3} + \frac{x+2}{7} = 5$

$$\frac{7(x+1)}{21} + \frac{3(x+2)}{21} = 5$$

$$\frac{7x+7+3x+6}{21} = 5$$

$$10x+13 = 21 \cdot 5$$

$$10x+13 = 105$$

$$10x = 92$$

$$x = 9.2$$

Solve the equation

$$9) \frac{x}{x+4} - 2 = \frac{11}{x^2-16} \quad (x-4)(x+4)$$

$$x(x-4) - 2(x^2-16) = 11(1)$$

$$x^2 + 4x - 2x^2 + 32 = 11$$

$$-x^2 - 4x + 32 = 11$$

$$x^2 + 4x - 21 = 0$$

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

$$x = -7, 3$$

$$11) \log_6(4x-1) = \frac{1}{2}$$

$$6^{\frac{1}{2}} = 4x-1$$

$$1 + \sqrt{6} = 4x$$

$$x = \frac{1 + \sqrt{6}}{4}$$

$$10) \sqrt{x+9} - \sqrt{x-7} = 2$$

$$\sqrt{x+9} = 2 + \sqrt{x-7}$$

$$x+9 = 4 + 4\sqrt{x-7} + x-7$$

$$x+9 = 4\sqrt{x-7} + x-3$$

$$12 = 4\sqrt{x-7}$$

$$3 = \sqrt{x-7}$$

$$9 = x-7$$

$$16 = x$$

12) Use the properties of logarithms to expand the logarithmic expression as much as possible. Where possible,

evaluate the logarithmic expression: $\log_5 \left(\sqrt[3]{\frac{x^2y}{25}} \right)$

$$\frac{1}{3} \log_5 \frac{x^2y}{25}$$

$$\frac{1}{3} (\log_5 x^2y - \log_5 25)$$

$$\frac{1}{3} (2\log_5 x + \log_5 y - 5)$$

$$\frac{2}{3} \log_5 x + \frac{1}{3} \log_5 y - \frac{5}{3}$$

13) Rationalize the denominator: $\frac{\sqrt{2} + \sqrt{3}}{\sqrt{2} - \sqrt{3}} \left(\frac{\sqrt{2} + \sqrt{3}}{\sqrt{2} + \sqrt{3}} \right)$

$$\frac{2 + 2\sqrt{6} + 3}{2 - 3}$$

$$\frac{5 + 2\sqrt{6}}{-1}$$

$$\rightarrow -5 - 2\sqrt{6}$$

14) If $f(x) = \frac{2x-5}{4}$, find $f^{-1}(x)$

$$y = \frac{2x-5}{4}$$

$$x = \frac{2y-5}{4}$$

$$4x = 2y - 5$$

$$2y = 4x + 5$$

$$y = \frac{4x+5}{2}$$

$$f^{-1}(x) = \frac{4x+5}{2}$$

15) If $f(x) = x^2 + x$ and $g(x) = 3x + 1$, find $(g \circ f)(x)$

$$g(f(x))$$

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

$$3x^2 + 3x + 1$$

$$(g \circ f)(x) = 3x^2 + 3x + 1$$

16) Find the distance between the points (6, 3) and (4, 1)

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(4 - 6)^2 + (1 - 3)^2}$$

$$d = \sqrt{(-2)^2 + (-2)^2}$$

$$= \sqrt{4 + 4}$$

$$= \sqrt{8}$$

$$d = 2\sqrt{2}$$

17) Write the equation of a circle in standard form if the endpoints of the diameter of the circle are (4, 6) and (-6, -2)

$$d = \sqrt{(-6 - 4)^2 + (-2 - 6)^2}$$

$$= \sqrt{(-10)^2 + (-8)^2}$$

$$= \sqrt{100 + 64}$$

$$= \sqrt{164}$$

$$= \sqrt{4 \cdot 41} = 2\sqrt{41}$$

radius = $\sqrt{41}$

center = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$$= \left(\frac{4 + (-6)}{2}, \frac{6 + (-2)}{2}\right)$$

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

$$= (-1, 2)$$

$$(x - 5)^2 + (y - 4)^2 = 41$$

18) If the given sequence is arithmetic, find the sum of the first 30 terms. If the sequence is geometric, find the sum of the first 8 terms.

a) 3, 9, 27, 81, ...

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

$$\frac{27}{9} = 3$$

$$r = 3$$

geometric

$$S_8 = \frac{a_1(1 - r^n)}{1 - r}$$

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

$$= \frac{3(1 - 6561)}{-2}$$

$$= \frac{3(-6560)}{-2}$$

$$= \frac{-19680}{-2}$$

$$S_8 = 9840$$

b) 2, 7, 12, 17, ...

$$7 - 2 = 5$$

$$12 - 7 = 5$$

$$d = 5$$

$$a_{30} = a_1 + (n - 1)d$$

$$= 2 + (30 - 1)5$$

$$= 2 + (29)5$$

$$= 2 + 145$$

$$a_{30} = 147$$

$$S_{30} = a_1 + (n - 1)d$$

$$= 2 + (30 - 1)5$$

$$= 2 + (29)5$$

$$= 2 + 145$$

$$S_{30} = 147$$