

Solve each of the inequalities

#1 Solve the inequality, be sure answer is in **interval notation**.

$$\frac{2x^2 + 7x - 15}{3x^2 + 5x - 2} \leq 0 \quad \frac{(2x-3)(x+5)}{(3x-1)(x+2)} \leq 0 \quad \#1 \quad [-5, -2) \cup (1/3, 1 1/2]$$

#2 Solve the inequality, be sure answer is in **interval notation**.

$$\frac{(g-3)(2g-5)}{(g-7)(g+2)} \leq 0 \quad \#2 \quad (-2, 2 1/2] \cup [3, 7)$$

Functions for problem #3

$f(x) = 2x - 7$, $g(x) = x^2 - 4x - 5$, $h(x) = x^2 + 4$

a. find $f(9) + g(2) + h(0)$

$$\begin{aligned} f(9) &= 2(9) - 7 = 18 - 7 = 11 \\ g(2) &= 2^2 - 4(2) - 5 = 4 - 8 - 5 = -9 \\ h(0) &= 0^2 + 4 = 0 + 4 = 4 \end{aligned}$$

#3a 6

b. find $f(f(3))$

$$\begin{aligned} f(3) &= 2(3) - 7 = 6 - 7 = -1 \\ f(-1) &= 2(-1) - 7 = -2 - 7 = -9 \end{aligned}$$

#3b -9

c. find $(g(h(f(2))))$

$$\begin{aligned} f(2) &= 2(2) - 7 = 4 - 7 = -3 \\ h(-3) &= (-3)^2 + 4 = 9 + 4 = 13 \\ g(13) &= 13^2 - 4(13) - 5 = 169 - 52 - 5 = 112 \end{aligned}$$

#3c 112

d. Find the **solution set** for $f(g(x)) = g(f(x))$

#3d $X = \{4.8787, 9.1213\}$

(Four decimal places)

$$\begin{aligned} \text{L.H.S.} \quad 2[x^2 - 4x - 5] - 7 &= \text{R.H.S.} \quad [2x - 7]^2 - 4[2x - 7] - 5 \\ 2x^2 - 8x - 10 - 7 &= 4x^2 - 28x + 49 - 8x + 28 - 5 \\ 2x^2 - 8x - 17 &= 4x^2 - 36x + 72 \quad \text{USE QUADRATIC FORMULA} \\ \rightarrow 0 &= 2x^2 - 28x + 89 \quad \rightarrow X = \{4.8787, 9.1213\} \end{aligned}$$

#4 Identify the **center** and the **radius**.

$$x^2 + y^2 - 4x + 6y - 3 = 0$$

#4 CENTER (2, -3) RADIUS: 4

$$x^2 - 4x + 4 + y^2 + 6y + 9 = 3 + 4 + 9$$

$$(x-2)^2 + (y+3)^2 = 16$$

#8 Solve the following systems of equations

ENTER INTO MATRIX EDITOR
THEN USE RREF OPTION

$$x + 3y - z = 13$$

a. $x + 2y + 3z = 4$

$$2x - 3y + 4z = 5$$

$$6x + 2y = 34$$

b. $3x - 4y = 7$

$$3x - y + 2z = 16$$

c. $x + 7y - 4z = -19$

$$5x - 2y + 2z = 27$$

a. (8, 1, -2)

b. (5, 2)

c. (4, -3, 1/2)

#9 Write the equation of each circle

(1, -5)

(2, -6)

(8, 2)

$$(x-5)^2 + (y+2)^2 = 25$$

$$x^2 - 10x + 25 + y^2 + 4y + 4 = -4 + 29$$

$$(x-5)^2 + (y+2)^2 = 25$$

USE GENERAL FORM

$$x^2 + Ax + y^2 + By + C = 0$$

(1, -5): $1 + A + 25 - 5B + C = 0$

$$A - 5B + C = -26$$

(2, -6): $4 + 2A + 36 - 6B + C = 0$

$$2A - 6B + C = -40$$

(8, 2): $64 + 8A + 4 + 2B + C = 0$

$$8A + 2B + C = -68$$

SYSTEM

$$\begin{bmatrix} 1 & -5 & 1 & -26 \\ 2 & -6 & 1 & -40 \\ 8 & 2 & 1 & -68 \end{bmatrix} \Rightarrow \begin{matrix} A = -10 \\ B = 4 \\ C = 4 \end{matrix}$$

#10 Solve (Answer as mixed numbers no decimals please)

a) $10|3x+5|^2 - 11|3x+5| = -3$

Let $k = |3x+5|$

So $10k^2 - 11k + 3 = 0$

$$(2k-1)(5k-3) = 0$$

THEN $k = \frac{1}{2}, \frac{3}{5}$

#12a $x = \left\{ -1\frac{7}{15}, -1\frac{1}{2}, -1\frac{5}{6}, -1\frac{13}{15} \right\}$

$$|3x+5| = \frac{1}{2}$$

$$|3x+5| = \frac{3}{5}$$

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

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

$$3x+5 = \frac{3}{5}$$

$$3x+5 = -\frac{3}{5}$$

$$3x = \frac{1}{2} - \frac{10}{2}$$

$$3x = -\frac{1}{2} - \frac{10}{2}$$

$$3x = \frac{3}{5} - \frac{25}{5}$$

$$3x = -\frac{3}{5} - \frac{25}{5}$$

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

$$3x = -\frac{11}{2}$$

$$3x = -\frac{22}{5}$$

$$3x = -\frac{28}{5}$$

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

$$x = -\frac{11}{6}$$

$$-\frac{22}{15}$$

$$-\frac{28}{15}$$

#11 Write each of the following in standard H, K forms identify characteristics of each

a. $25x^2 + 4y^2 - 150x + 8y + 129 = 0$

$$25[x^2 - 6x + 9] + 4[y^2 + 2y + 1] = -129$$

$$25(x-3)^2 + 4(y+1)^2 = 100$$

$$\frac{(x-3)^2}{4} + \frac{(y+1)^2}{25} = 1$$

#11a. Characteristics: VERTICAL ELLIPSE
 CENTER (3, -1)
 MAJOR ENDOPOINTS (3, -6) & (3, 4)
 MINOR ENDOPOINTS (1, -1) & (5, -1)

b. $x^2 + 8x - 2y + 2 = 0$

$$x^2 + 8x + 2 = 2y$$

$$(x^2 + 8x + 16) + 2 - 16 = 2y$$

$$(x+4)^2 - 14 = 2y$$

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

$$\#11b. \ y = \frac{1}{2}(x+4)^2 - 7$$

Characteristics: PARABOLA
 VERTEX (-4, -7)
 OPENS UPWARD
 OBTUSE OPENING
 $\Delta x = 2$

#12. Find the area of of the triangle with vertices at (3, 1), (-5, -2), and (11, -3)

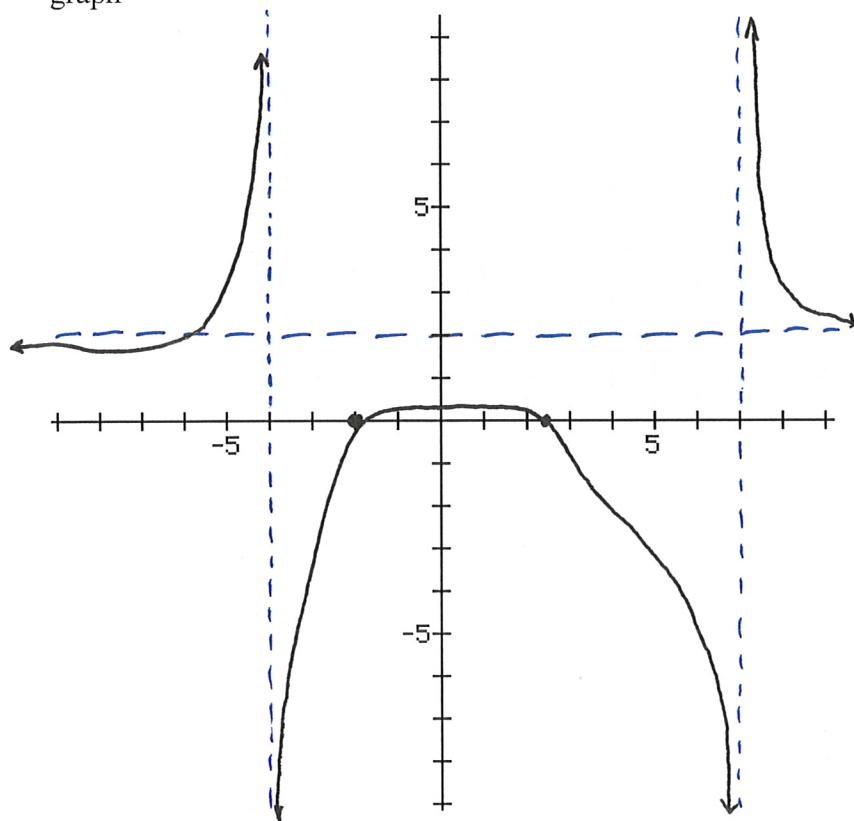
$$\frac{1}{2} \begin{vmatrix} 3 & 1 & 1 \\ -5 & -2 & 1 \\ 11 & -3 & 1 \end{vmatrix} = \frac{1}{2} |56| = 28 \text{ UNITS}$$

#12 28 UNITS

Graph and identify zeroes, all asymptotes, and perform a sign check.

$$13a. y = \frac{2x^2 - x - 10}{x^2 - 3x - 28} = \frac{(2x-5)(x+2)}{(x-7)(x+4)}$$

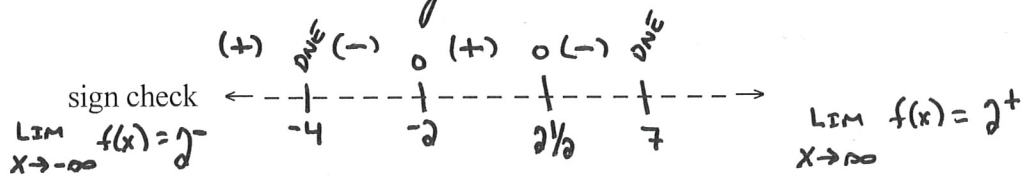
graph



zeroes $x = \{-2, 2.5\}$

vertical asymptotes $x \neq \{-4, 7\}$

horizontal asymptotes $y = 2$



13b State the domain and range using **interval notation**.

13b Domain: $(-\infty, -4) \cup (-4, 7) \cup (7, \infty)$ 13b Range: $(-\infty, .3572] \cup [1.8742, \infty)$

* USE MAX / MIN OPTION ON GRAPH TO IDENTIFY THESE VALUES