Name Key
Pre-Calculus

Quarter 3
Test 1 - Review

1) What are the dimensions of $\begin{bmatrix} 1 & 5 & 0 & -1 \\ 6 & -2 & 8 & -4 \end{bmatrix}$?

A) 4×4 (B) 2×4 C) 2×2 D) 4×2

2) If the augmented matrix for a system is $\begin{bmatrix} 2 & 1 & 3 \\ 3 & 2 & 1 \end{bmatrix}$, what is the system of equations?

(A) $2x + y = 3$ and $3x + 2y = 1$
B) $2x + 3y = 1$ and $3x + y = 2$
C) $2x - y = 3$ and $3x - 2y = 1$
D) $3x + y = 3$ and $x + 2y = 1$

3) If the augmented matrix for a system is $\begin{bmatrix} 1 & 0 & 3 \\ 0 & 2 & 4 \end{bmatrix}$, what is the solution?

A) $\{(0,2)\}$ B) $\{(1,2)\}$ $2y=4$, $y=2$ (C) $\{(3,2)\}$ D) $\{(3,4)\}$ $x=3$

4) Name the following matrix by its dimensions:

$M = \begin{bmatrix} 3 & 1 \\ 1 & 3 \\ 5 & 7 \end{bmatrix}$ 3×2

5) Write a matrix B of order 2×3 whose elements are $b_{11} = 2$, $b_{12} = 3$, $b_{13} = 4$, $b_{21} = -3$, $b_{22} = -4$, and $b_{23} = 5$.

$\begin{bmatrix} 2 & 3 & 4 \\ -3 & -4 & 5 \end{bmatrix}$

6) Solve the system of linear equations for all variables:

$2x - y + z = 6$
$-x + 2y + z = 0$
$x + y - z = -3$

$\begin{bmatrix} 2 & -1 & 1 & 6 \\ -1 & 2 & 1 & 0 \\ 1 & 1 & -1 & -3 \end{bmatrix}$

7) Solve the following system of equations using elimination (NOT MATRICES)

$x+3y+z=3$
$x+5y+5z=1$
$2x+6y+3z=8$

Q3, T1 Review Key

6) $2x - y + z = 6$

$-x + 2y + z = 0$

$x + y - z = -3$

$$\begin{bmatrix} 2 & -1 & 1 & 6 \\ -1 & 2 & 1 & 0 \\ 1 & 1 & -1 & -3 \end{bmatrix}$$

R_3, R_1

$$\begin{bmatrix} 1 & 1 & -1 & -3 \\ -1 & 2 & 1 & 0 \\ 2 & -1 & 1 & 6 \end{bmatrix}$$

$R_1 + R_2$

$$\begin{bmatrix} 1 & 1 & -1 & -3 \\ 0 & 3 & 0 & -3 \\ 2 & -1 & 1 & 6 \end{bmatrix}$$

$-2R_1 + R_3$

$$\begin{bmatrix} 1 & 1 & -1 & -3 \\ 0 & 3 & 0 & -3 \\ 0 & -3 & 3 & 12 \end{bmatrix}$$

$-2R_1 + R_3$

$-2 \; -2 \; 2 \; 6$

$+ \; 2 \; -1 \; 1 \; 6$

$0 \; -3 \; 3 \; 12$

$\frac{1}{3}R_2$

$$\begin{bmatrix} 1 & 1 & -1 & -3 \\ 0 & 1 & 0 & -1 \\ 0 & -3 & 3 & 12 \end{bmatrix}$$

$3R_2 + R_3$

$0 \; 3 \; 0 \; -3$

$+ \; 0 \; -3 \; 3 \; 12$

$0 \; 0 \; 3 \; 9$

$3R_2 + R_3$

$$\begin{bmatrix} 1 & 1 & -1 & -3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 3 & 9 \end{bmatrix}$$

$\frac{1}{3}R_3$

$$\begin{bmatrix} 1 & 1 & -1 & -3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

$z = 3$

$y = -1$

$x + y - z = -3$

$x - 1 - 3 = -3$

$x - 4 = -3$

$x = 1$

$(1, -1, 3)$

7) $x + 3y + z = 3$ ①

$x + 5y + 5z = 1$ ②

$2x + 6y + 3z = 8$ ③

① $x + 3y + z = 3$

② $-1(x + 5y + 5z = 1)$

$x + 3y + z = 3$

$-x - 5y - 5z = -1$

④ $-2y - 4z = 2$

② $-2(x + 5y + 5z = 1)$

③ $2x + 6y + 3z = 8$

$-2x - 10y - 10z = -2$

$2x + 6y + 3z = 8$

⑤ $-4y - 7z = 6$

$-2(-2y - 4z = 2)$

$-4y - 7z = 6$

$4y + 8z = -4$

$-4y - 7z = 6$

$z = 2$

$-2y - 4z = 2$

$-2y - 4(2) = 2$

$-2y - 8 = 2$

$\frac{-2y}{-2} = \frac{10}{-2}$

$y = -5$

$x + 3y + z = 3$

$x + 3(-5) + 2 = 3$

$x - 15 + 2 = 3$

$x - 13 = 3$

$x = 16$

$(16, -5, 2)$

Q3, T1 Review

8) $x - 3z = -2$

$3x + y - 2z = 5$

$2x + 2y + z = 4$

$$\begin{bmatrix} 1 & 0 & -3 & -2 \\ 3 & 1 & -2 & 5 \\ 2 & 2 & 1 & 4 \end{bmatrix} \quad -3R_1 + R_2$$

$$\begin{array}{r} -3\ 0\ 9\ 6 \\ +\ 3\ 1\ -2\ 5 \\ \hline 0\ 1\ 7\ 11 \end{array}$$

$$\begin{bmatrix} 1 & 0 & -3 & -2 \\ 0 & 1 & 7 & 11 \\ 2 & 2 & 1 & 4 \end{bmatrix} \quad -2R_1 + R_3$$

$$\begin{array}{r} -2\ 0\ 6\ 4 \\ +\ 2\ 2\ 1\ 4 \\ \hline 0\ 2\ 7\ 8 \end{array}$$

$$\begin{bmatrix} 1 & 0 & -3 & -2 \\ 0 & 1 & 7 & 11 \\ 0 & 2 & 7 & 8 \end{bmatrix} \quad -2R_2 + R_3$$

$$\begin{array}{r} 0\ -2\ -14\ -22 \\ 0\ 2\ 7\ 8 \\ \hline 0\ 0\ -7\ -14 \end{array}$$

$$\begin{bmatrix} 1 & 0 & -3 & -2 \\ 0 & 1 & 7 & 11 \\ 0 & 0 & -7 & -14 \end{bmatrix} \quad -\frac{1}{7}R_3$$

$$\begin{bmatrix} 1 & 0 & -3 & -2 \\ 0 & 1 & 7 & 11 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

$z = 2$

$y + 7z = 11$

$y + 7(2) = 11$

$y + 14 = 11$

$y = -3$

$x - 3z = -2$

$x - 3(2) = -2$

$x - 6 = -2$

$x = 4$

$(4, -3, 2)$

9) $x - 2y + 3z = 9$ ①

$-x + 3y = -4$ ②

$2x - 5y + 5z = 17$ ③

$-5(x - 2y + 3z = 9)$

$3(2x - 5y + 5z = 17)$

$-5x + 10y - 15z = -45$

$6x - 15y + 15z = 51$

$x - 5y = 6$ ④

② + ④

$-x + 3y = -4$

$x - 5y = 6$

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

$y = -1$

$-x + 3y = -4$

$-x + 3(-1) = -4$

$-x - 3 = -4$

$+3 \quad +3$

$-x = -1$

$x = 1$

$x - 2y + 3z = 9$

$1 - 2(-1) + 3z = 9$

$1 + 2 + 3z = 9$

$3 + 3z = 9$

$3z = 6$

$z = 2$

$(1, -1, 2)$

Q1, T3 Review

10) a) $7x - 2y = 14$

$-3y + 7x = 21$

$7x - 2y = 14$

$-1(7x - 3y = 21)$

$7x - 2y = 14$

$-7x + 3y = -21$

$y = -7$

$7x - 2y = 14$

$7x - 2(-7) = 14$

$7x + 14 = 14$

$7x = 0$

$x = 0$

$(0, -7)$

b) $-4x + 5y - 14 = 0$

$8 + 4x = 3y$

$-4x + 5y = 14$

$4x - 3y = -8$

$\frac{2y}{2} = \frac{6}{2}$

$y = 3$

$8 + 4x = 3y$

$8 + 4x = 3(3)$

$8 + 4x = 9$

$4x = 1$

$x = \frac{1}{4}$

$(\frac{1}{4}, 3)$

c) $93 - 9 = 4b$

$9 + 4b = 43$

$-9 - 4b = -93$

$9 + 4b = 43$

$0 + 0 = -50$

$0 = -50$

no solution

d) $3(8x + 12y = 48)$

$-4(6x + 9y = 36)$

$24x + 36y = 144$

$-24x - 36y = -144$

$0 + 0 = 0$

$0 = 0$

infinite # of solutions

e) $4x - 5y = -6$

$-3y - 2 = -x$

$4x - 5y = -6$

$-4(x - 3y = 2)$

$4x - 5y = -6$

$-4x + 12y = -8$

$\frac{7y}{7} = \frac{-14}{7}$

$y = -2$

$4x - 5y = -6$

$4x - 5(-2) = -6$

$4x + 10 = -6$

$\frac{4x}{4} = \frac{-16}{4}$ $x = -4$

$(-4, -2)$

11)

a) G
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 3 & 1 & -1 & 2 \\ 2 & 3 & 2 & 7 \end{bmatrix}$$
$-3R_1 + R_2$

b) H
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 0 & 7 & -4 & -19 \\ 2 & 3 & 2 & 7 \end{bmatrix}$$
$-3R_1 + R_2$

$$\begin{array}{r} -3\ 6\ -3\ -21 \\ +\ 3\ 1\ -1\ 2 \\ \hline 0\ 7\ -4\ -19 \end{array}$$

$-2R_1 + R_3$

c) J
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 0 & 7 & -4 & -19 \\ 0 & 7 & 0 & -7 \end{bmatrix}$$
$-2R_1 + R_3$

$$\begin{array}{r} -2\ 4\ -2\ -14 \\ +\ 2\ 3\ 2\ 7 \\ \hline 0\ 7\ 0\ -7 \end{array}$$

$-1R_2 + R_3$

d) K
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 0 & 7 & -4 & -19 \\ 0 & 0 & 4 & 12 \end{bmatrix}$$
$-1R_2 + R_3$

$$\begin{array}{r} 0\ -7\ 4\ 19 \\ +\ 0\ 7\ 0\ -7 \\ \hline 0\ 0\ 4\ 12 \end{array}$$

e) L
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 0 & 7 & 0 & -7 \\ 0 & 0 & 4 & 12 \end{bmatrix}$$
$R_3 + R_2$

f) P
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 4 & 12 \end{bmatrix}$$
$\frac{1}{7}R_2$

g) Q
$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$
$\frac{1}{4}R_3$

$z = 3$

$y = -1$

$x - 2y + z = 7$

$x - 2(-1) + 3 = 7$

$x + 2 + 3 = 7$

$x + 5 = 7$

$x = 2$ $\quad (2, -1, 3)$

Q3 T1 Review

a)

12) $\frac{x}{x-2} - \frac{8}{x+3} = \frac{10}{x^2+x-6}$

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

$x(x+3) - 8(x-2) = 10$

$x^2 + 3x - 8x + 16 = 10$

$x^2 - 5x + 6 = 0$

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

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

$\boxed{x = 3} \quad x = 2$ reject

b) $\frac{9}{x} + \frac{9}{x-2} = \frac{12}{1}$

$x(x-2)$

$9x - 18 + 9x = 12x^2 - 24x$

$18x - 18 = 12x^2 - 24x$

$-18x + 18 \qquad -18x + 18$

$0 = 12x^2 - 42x + 18$

$= 6(2x^2 - 7x + 3)$

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

$2x - 1 = 0 \quad x - 3 = 0$

$2x = 1 \quad \boxed{x = 3}$

$\boxed{x = \frac{1}{2}}$

c) $\frac{4}{x-1} = \frac{5}{2x-2} + \frac{3x}{4}$

$2(x-1)$ $\quad 4(x-1)$ $\quad 4(x-1)$

$16 = 10 + 3x^2 - 3x$

$16 = 3x^2 - 3x + 10$

$-16 \qquad\qquad -16$

$0 = 3x^2 - 3x - 6$

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

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

$x-2=0 \quad x+1=0$

$\boxed{x=2 \quad x=-1}$

d) $\frac{1}{2a} - \frac{9}{a^2+6a} = \frac{2-a}{2a+12}$

$2a(a+6)$ $\quad 2a(a+6)$ $\quad 2a(a+6)$

$a(a+6) \quad 2(a+6)$

$a+6-18 = a(2-a)$

$a-12 = 2a - a^2$

$a^2 - a - 12 = 0$

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

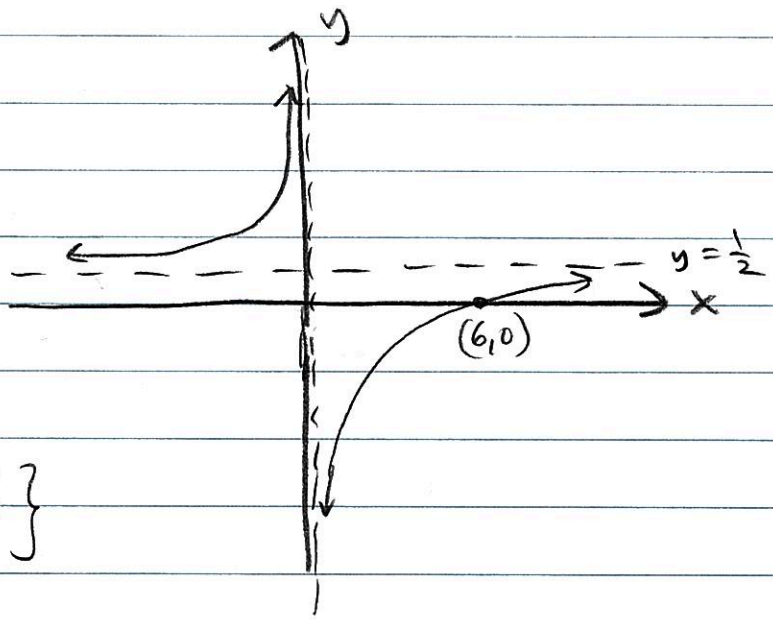
$a-4=0 \quad a+3=0$

$\boxed{a=4 \quad a=-3}$

Q3 T1 Review

13 a) $\frac{x-2}{x} = \frac{x+2}{2x}$

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



PVA $x = 0$

EB

$y = 1 - \frac{1}{2}$

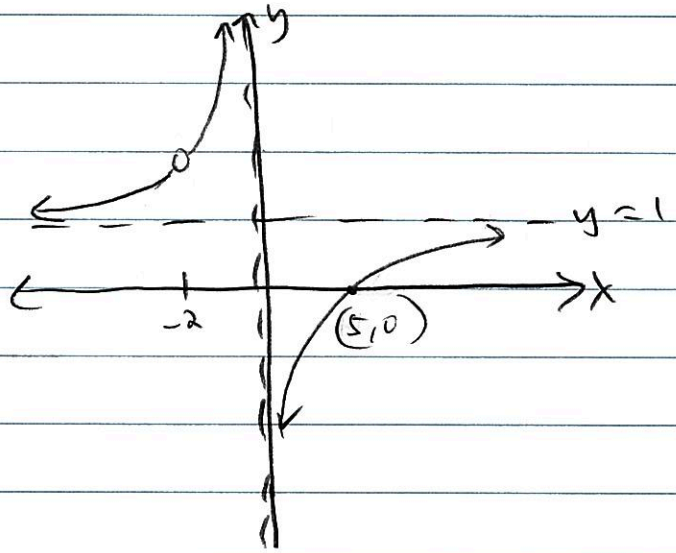
$y = \frac{1}{2}$

{6}

b) $\frac{x}{x+2} = \frac{3}{x} + \frac{4}{x^2+2x}$

$\frac{x}{x+2} - \frac{3}{x} - \frac{4}{x^2+2x} = 0$

$x(x+2)$



PVA

$x = -2$ (hole - no V.A.)

$x = 0$

EB

$y = 1 - 0 - 0$

$y = 1$

{5}

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

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

$2x+1=0$

$2x=-1$

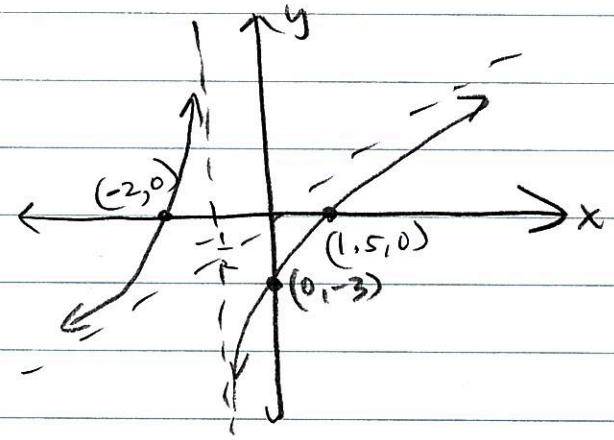
$x=-\frac{1}{2}$

PVA

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

$y=\frac{1}{2}x - 0$

$y=\frac{1}{2}x$



$\{-2, 1.5\}$

14) a) $\frac{x-1}{4} \geq \frac{8}{x+3}$

$\frac{x-1}{4} - \frac{8}{x+3} \geq 0$

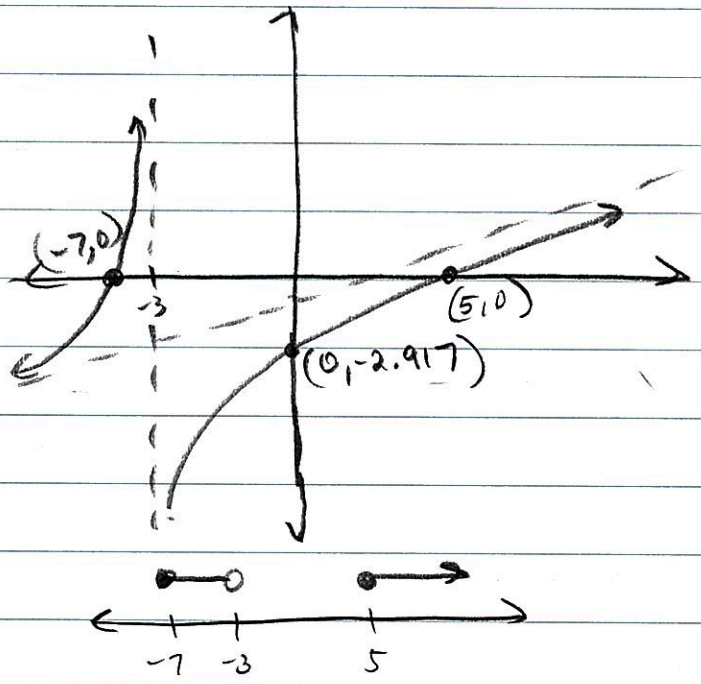
PVA

$x=-3$

EB

$y=\frac{1}{4}x - \frac{1}{4} - 0$

$=\frac{1}{4}x - \frac{1}{4}$



Set $\{x \mid -7 \leq x < -3 \vee x \geq 5\}$

Int $[-7,-3) \cup [5, \infty)$

14 b) $\frac{x-3}{x+2} - 8 < 0$

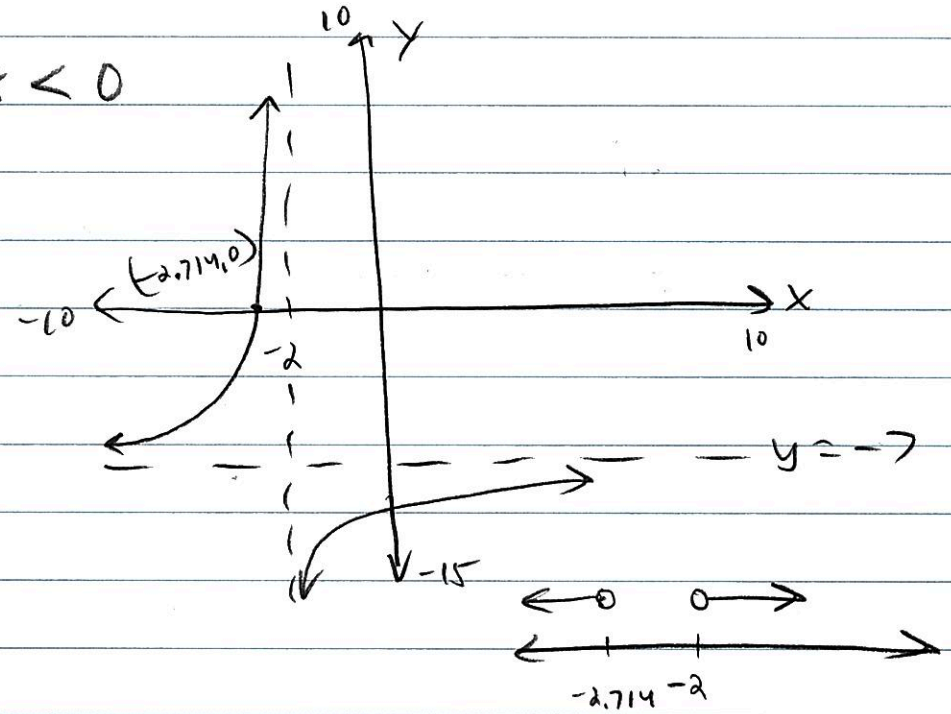
PVA

$x = -2$

EB

$y = 1 - 8$

$y = -7$



set $\{x \mid x < -2.714 \cup x > -2\}$

Int $(-\infty, -2.714) \cup (-2, \infty)$

14 c) $\frac{3}{x+1} + \frac{2}{x} < 6$

$\frac{3}{x+1} + \frac{2}{x} - 6 < 0$

PVA

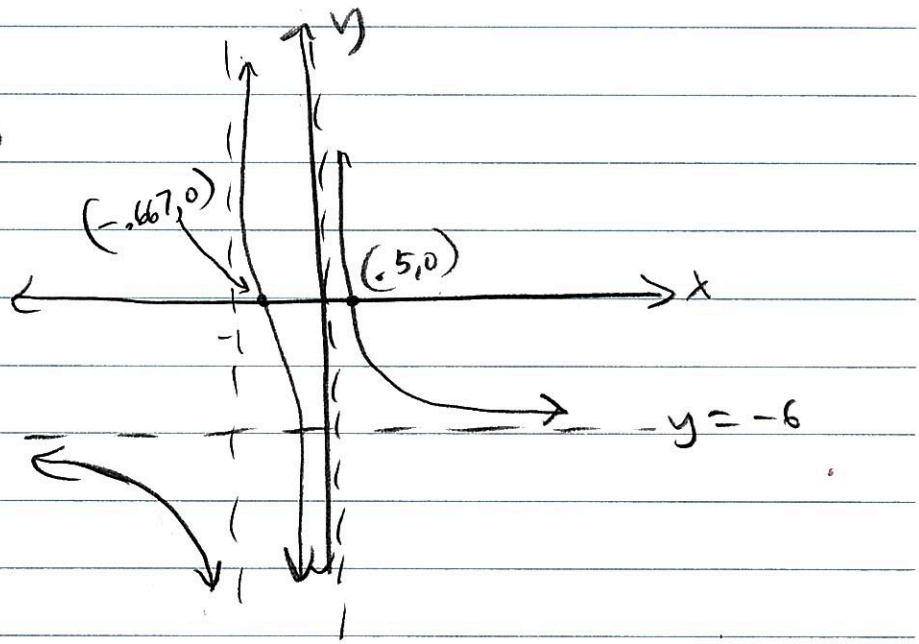
$x = -1$

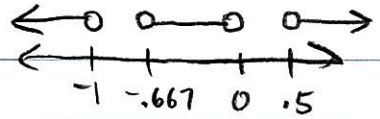
$x = 0$

EB

$y = 0 - 0 - 6$

$y = -6$





set $\{x \mid x < -1 \cup -.667 < x < 0 \cup x > .5\}$

Int: $(-\infty, -1) \cup (-.667, 0) \cup (.5, \infty)$