

$$f. f(x) = \frac{x^2 + 8x + 16}{x + 8} = \frac{(x+4)(x+4)}{x+8}$$

POD: NONE

VA: $x = -8$

HA: NONE

OA:

$$x+8 \overline{) x^2 + 8x + 16}$$

$$\begin{array}{r|rrr} -8 & 1 & 8 & 16 \\ & \downarrow & +8 & +0 \\ \hline x & 1 & 0 & 16 \end{array}$$

$$f(x) = \underbrace{x} + \frac{16}{x+8}$$

→ as $x \rightarrow \pm \infty$, $\frac{16}{x+8} \rightarrow 0$

as $x \rightarrow \pm \infty$ $f(x) \rightarrow x$

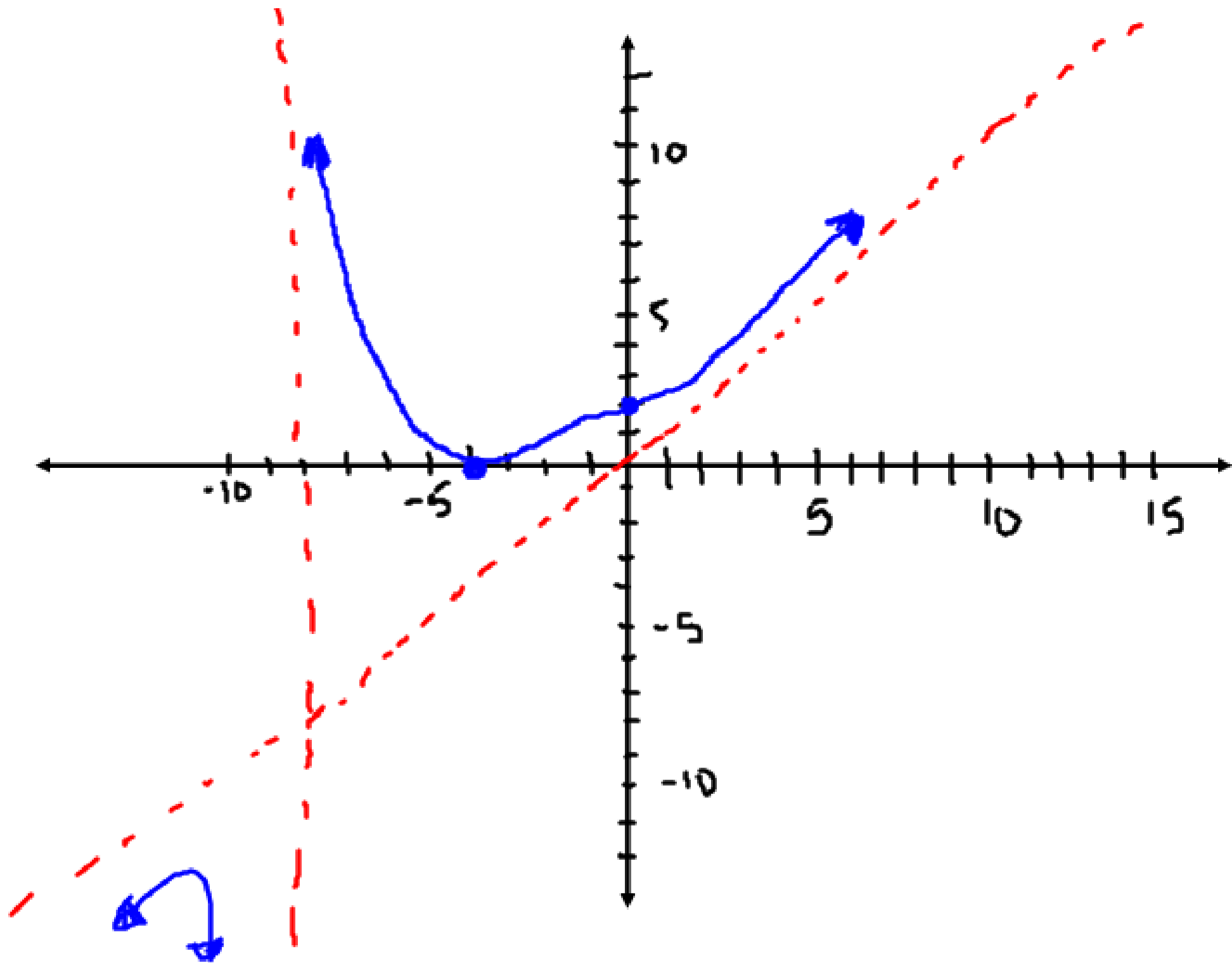
long term behaviour

OA: $y = x$

$$\begin{array}{l} x\text{-int (y=0)} \\ x^2 + 8x + 16 = 0 \\ (x+4)(x+4) = 0 \\ (-4, 0) \quad (-4, 0) \end{array}$$

Bounce

$$\begin{array}{l} y\text{-int (x=0)} \\ y = \frac{0+0+16}{0+8} \\ y = 2 \\ (0, 2) \end{array}$$



9.3

Connecting Graphs and Rational Equations

Focus on...

- relating the roots of rational equations to the x -intercepts of the graphs of rational functions
- determining approximate solutions to rational equations graphically

Your Turn

- a) Determine the roots of the equation $\frac{14}{x} - x + 5 = 0$ algebraically.
- b) Determine the x -intercepts of the graph of the corresponding function $y = \frac{14}{x} - x + 5$.
- c) Explain the connection between the roots of the equation and the x -intercepts of the graph of the corresponding function.

① look for NPV: $x \neq 0$

② mult each term by x .

$$\frac{14}{x}(x) - x(x) + 5(x) = 0(x)$$

$$14 - x^2 + 5x = 0$$

$$0 = x^2 - 5x - 14$$

$$0 = (x+2)(x-7)$$

$$x = -2, x = 7$$

B) x -int $(2, 0)$ $(7, 0)$

$$y = \frac{14}{x} - x + 5$$

$$VA: x = 0$$

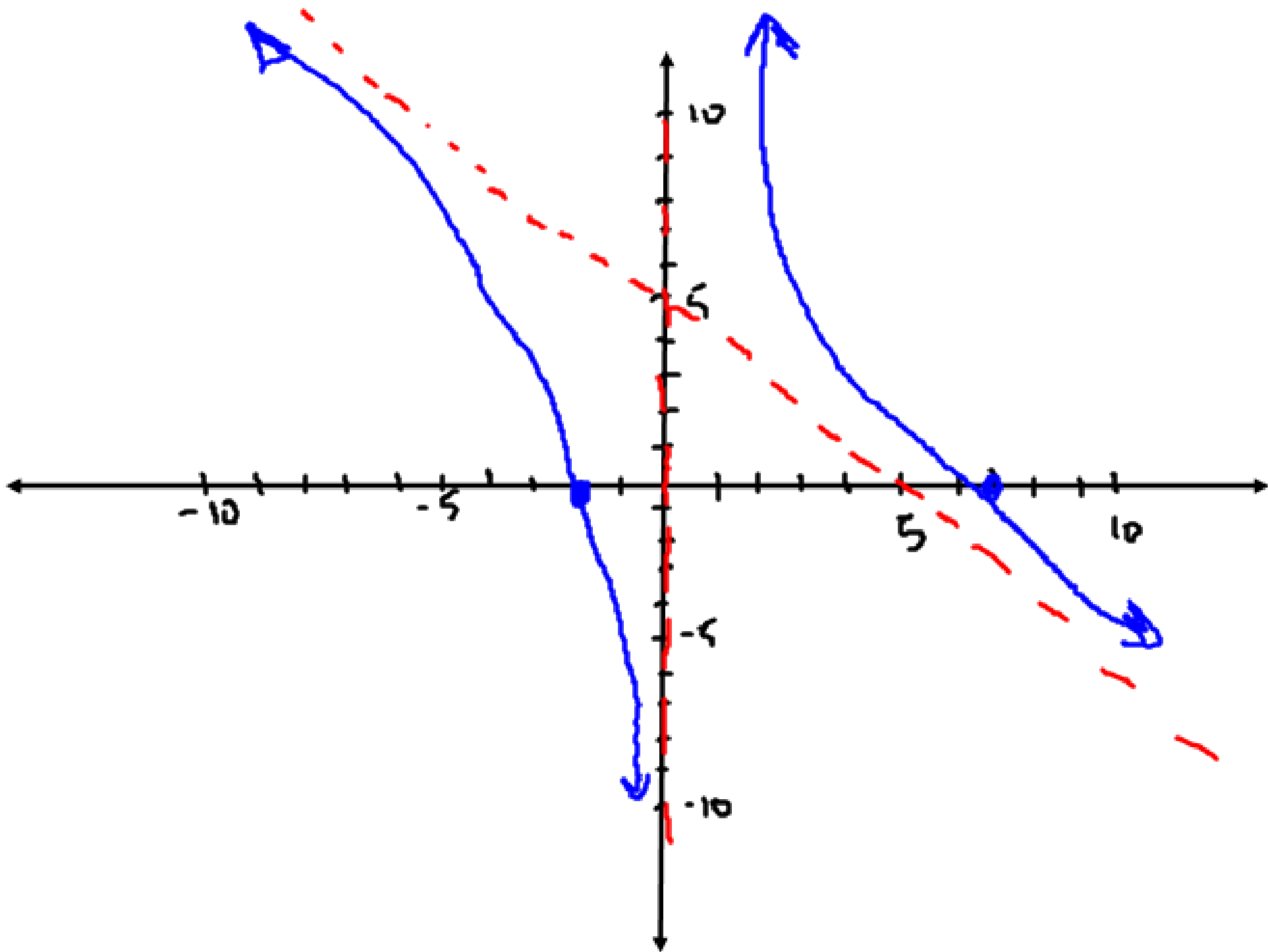
long term behaviour

$$x \rightarrow \pm\infty, \frac{14}{x} \rightarrow 0$$

$$f(x) \rightarrow -x + 5$$

$$OA: y = -x + 5 \quad HA: \text{None}$$

y -int NONE



Your Turn

a) Solve the equation $2 - \frac{3x}{2} = \frac{1 + 4x - x^2}{4x + 10}$ graphically. Express your answer to the nearest hundredth.

b) Verify your solution algebraically.

$$\text{NDV: } 4x + 10 \neq 0 \\ x \neq -\frac{5}{2}$$

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

$$\frac{2}{1} \left(\frac{4x + 10}{4x + 10} \right) - \frac{3x}{2} \left(\frac{2x + 5}{2x + 5} \right) = \frac{1 + 4x - x^2}{4x + 10}$$

$$\frac{(8x + 20) - (6x^2 + 15x)}{4x + 10} = \frac{1 + 4x - x^2}{4x + 10}$$

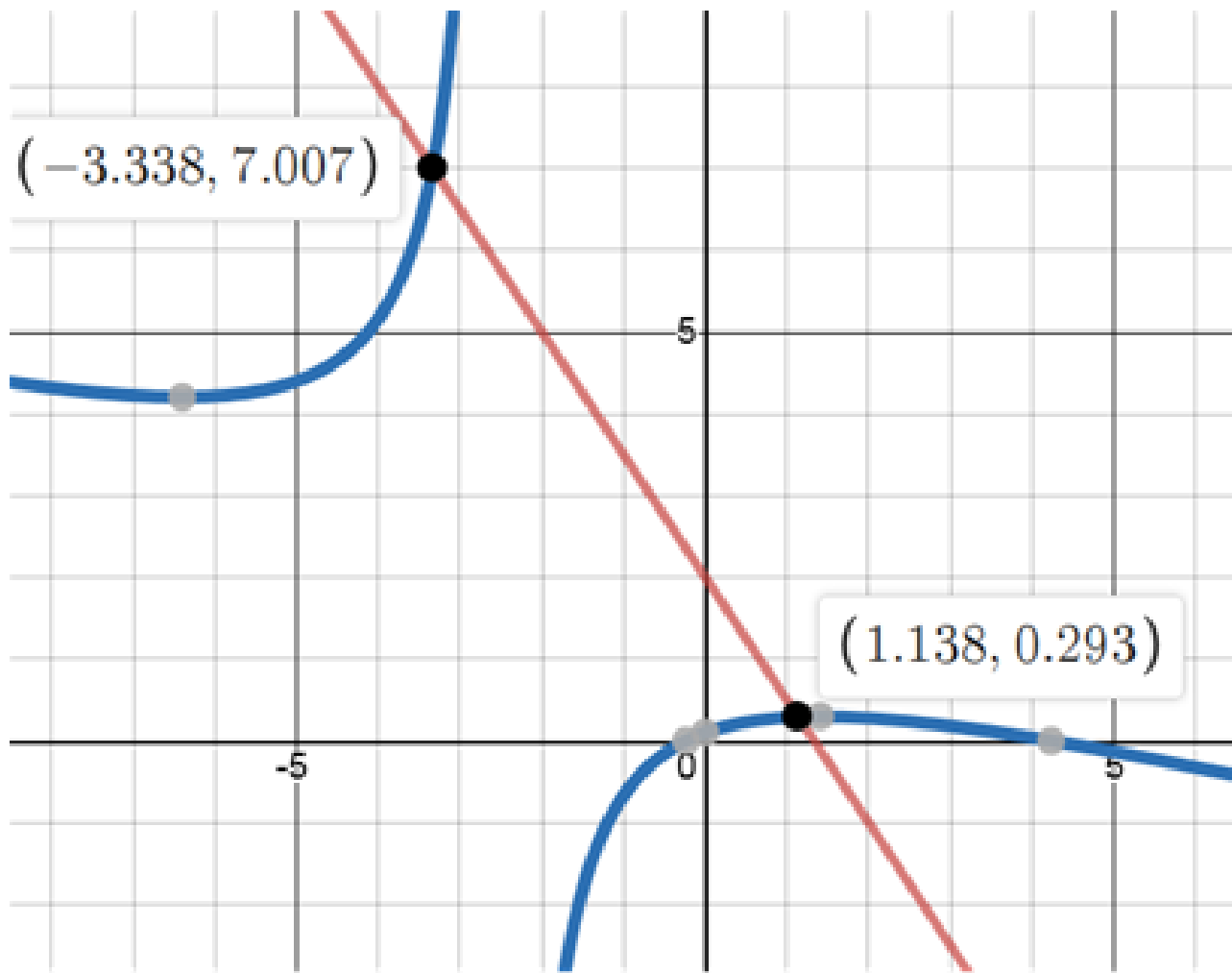
$$\rightarrow \frac{-6x^2 - 7x + 20}{4x + 10} = \frac{1 + 4x - x^2}{4x + 10}$$

$$-6x^2 - 7x + 20 = 1 + 4x - x^2 \\ 0 = 5x^2 + 11x - 19$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\vdots$$

$$x = -3.34 \quad x = +1.14$$



$$y = \frac{1+4x-x^2}{4x+10}$$

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

Your Turn

- a) Solve the equation $\frac{x+3}{2x-6} = 2x - \frac{x}{3-x}$ algebraically and graphically.
- b) Compare the solutions found using each method.

$$\text{NPV: } 2x-6 \neq 0 \\ x \neq 3$$

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

get common denom. of $2(x-3)$

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

$$\frac{x+3}{2x-6} = \frac{(4x^2 - 12x) + (2x)}{2x-6}$$

$$\rightarrow x+3 = 4x^2 - 10x$$

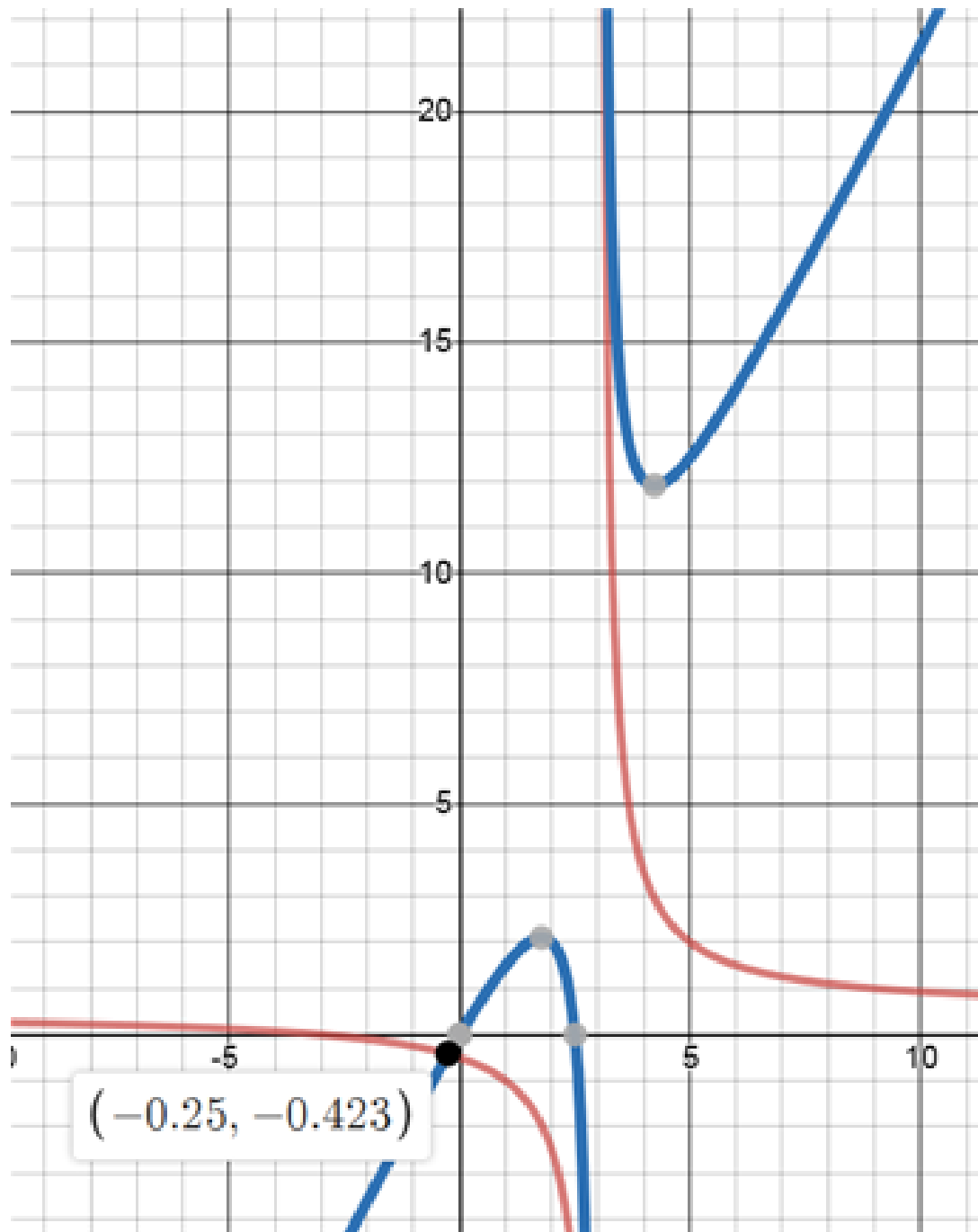
$$0 = 4x^2 - 11x - 3$$

$$0 = (4x+1)(x-3)$$

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

$$x = 3$$

reject
NPV



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



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

HW: Pg 465
2, 3, 5, 6
+ sheet

Your Turn

Megan and her friends are organizing a fundraiser for the local children's hospital. They are asking local businesses to each donate a door prize. So far, they have asked nine businesses, but only one has donated a prize. Their goal was to have three quarters of the businesses donate. If they succeed in getting every business to donate a prize from now on, how many more businesses do they need to ask to reach their goal?