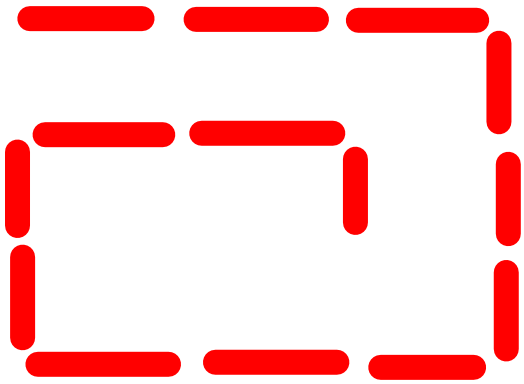
New born = 50cm

10 years = 138.4cm

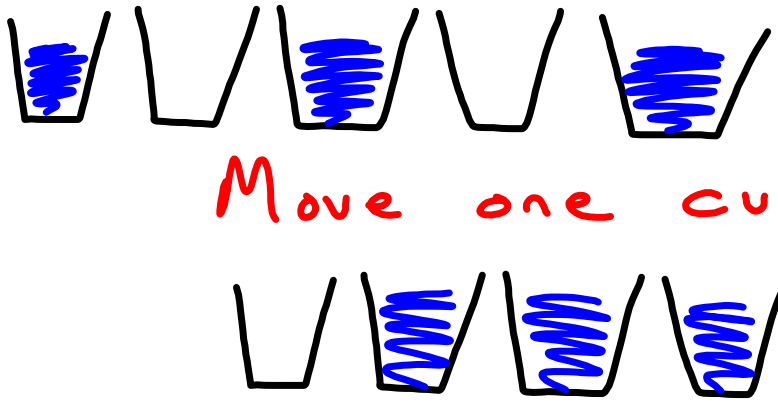
138.4 - 50 = 88.4cm

$$\begin{array}{r} \times 8 \\ \hline 707.2 \end{array}$$

Thats a huge 80 year old..



Move 2 sticks to make 2 squares. (with no stick left over)


Move one cup

Reciprocal of a Quadratic Function

Recall from last year.

Determine the restrictions of the function $\frac{1}{x^2 - 3x - 10}$

$x^2 - 3x - 10$ *Factor

$\otimes -10$ $\quad 1 \quad 10$

$\oplus -3$ $\quad 2 \quad -5$

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

$\neq 0$

$\neq 0$

$x+2=0$ $\quad x-5=0$

$x=-2$ $\quad x=5$

Restrictions

$x \neq -2, 5$

For the following function, $f(x) = \frac{1}{x^2 - 3x - 10} = \frac{1}{(x+2)(x-5)}$

a) State the domain of the function.

$D \to \{x \in \mathbb{R} \mid x \neq -2, 5\}$

$D \to (-\infty, 2) \cup (-2, 5) \cup (5, \infty)$

b) Determine the equations of asymptotes.

$x = -2$

$x = 5$

c) Determine the x and y intercepts.

x-int $y = 0$

$0 = \frac{1}{(x^2 - 3x - 10)}$

$0 = 1$ No x-int

y-int $(x = 0)$

$y = \frac{1}{0^2 - 3(0) - 10}$

y-int $= -\frac{1}{10}$

d) Determine the bahaviour of the function near the asymptotes.

and as $x \to -\infty$ and $x \to \infty$

as $x \to -2^-$ $f(x) \to \infty$

as $x \to -2^+$ $f(x) \to -\infty$

as $x \to 5^-$ $f(x) \to -\infty$

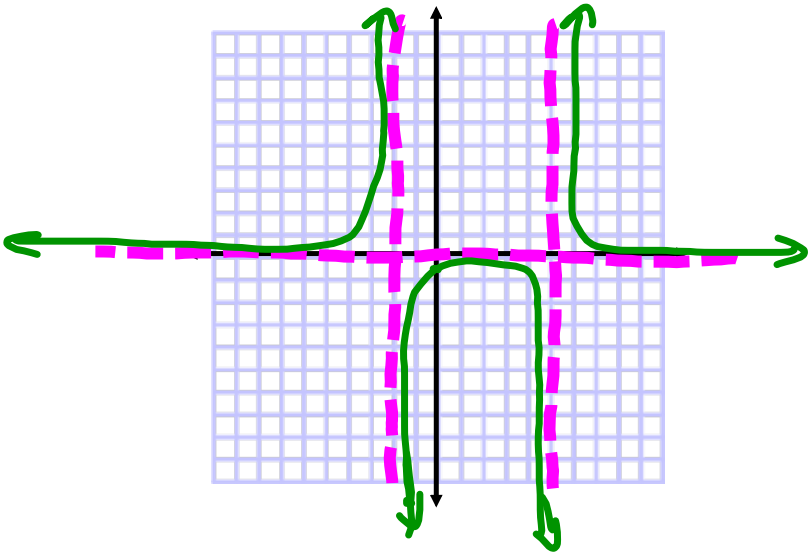
as $x \to 5^+$ $f(x) \to \infty$

testing points around the asymptotes

as $x \to -\infty$ $f(x) \to 0$

$x \to \infty$ $f(x) \to 0$

e) Sketch the graph, $f(x) = \dfrac{1}{x^2 - 3x - 10}$



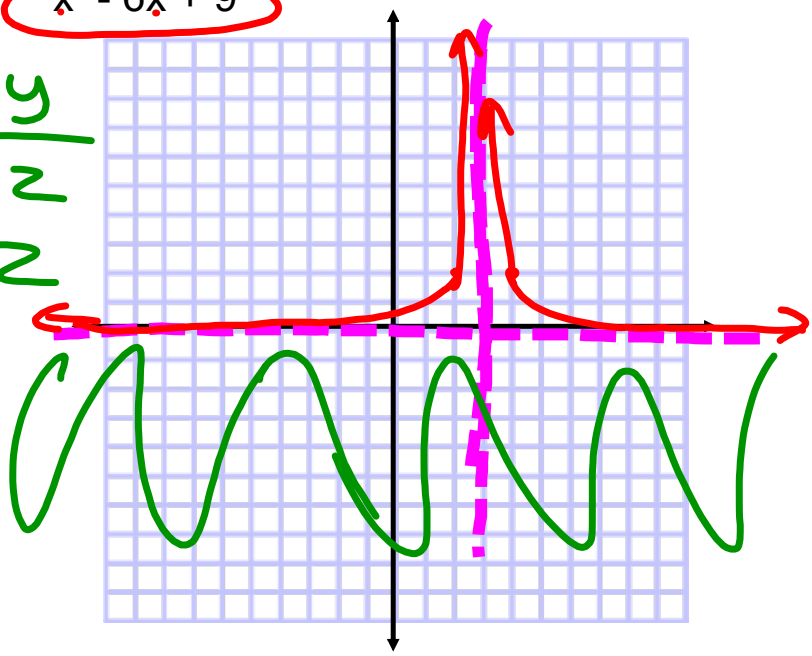
Sketch the graph of $g(x) = \frac{2}{x^2 - 6x + 9}$

$\frac{2}{(x-3)^2}$

x	y
2	2
4	2

as $x \to 3^-$ $f(x) \to \infty$

as $x \to 3^+$ $f(x) \to \infty$

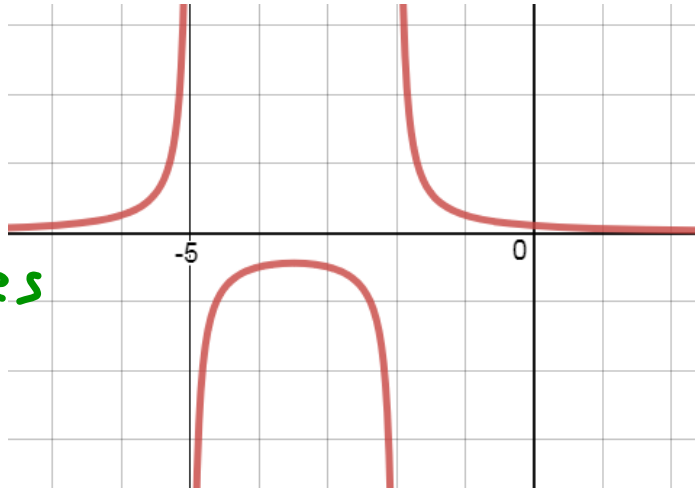


Different options for reciprocal functions with a quadratic as the denominator

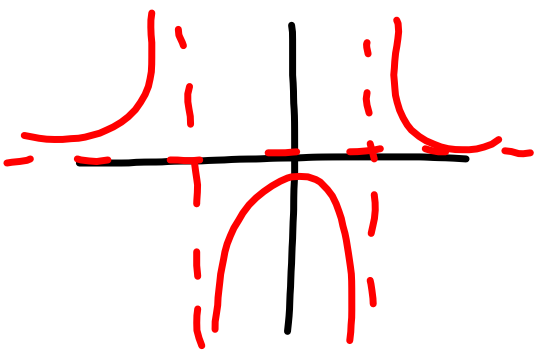
Case 1

$$\frac{1}{(x^2 + 7x + 10)}$$

has 2 roots
∴ 2 asymptotes



'+ ve'



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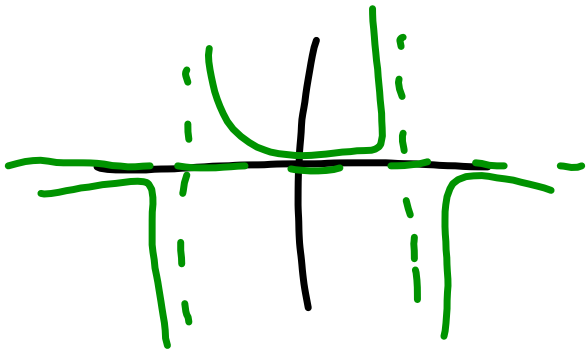
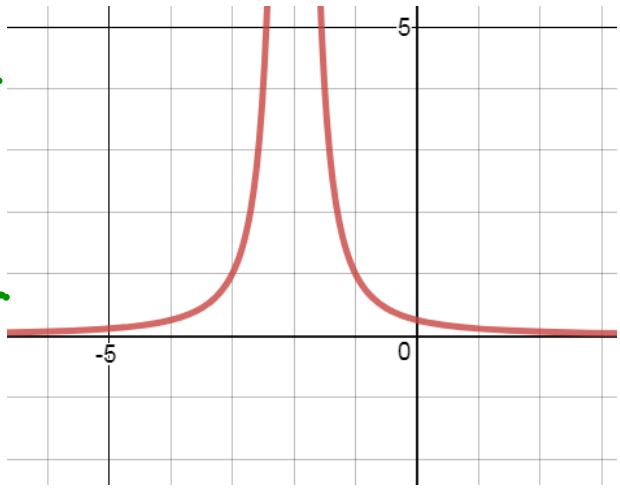


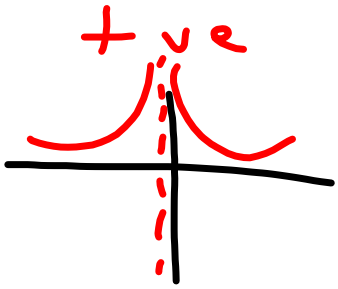
Case 2

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

has one root

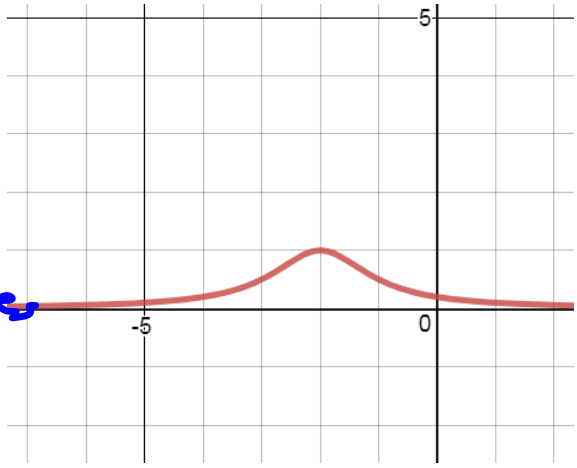
∴ one asymptote





Case 3

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



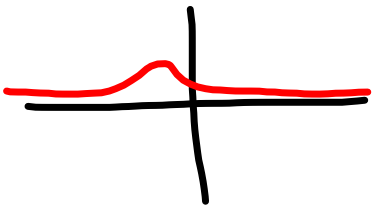
No real roots

∴ No V. Asymptotes

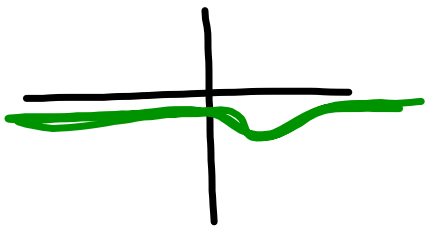
"Hump" occurs at the same x-value as the vertex would be for the denominator.

$$\underset{(x\text{-value})}{\text{Bump}} = \frac{-b}{2a}$$

+ ve



− ve



pg. 165
2, 5