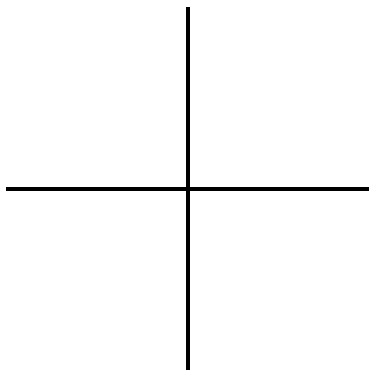
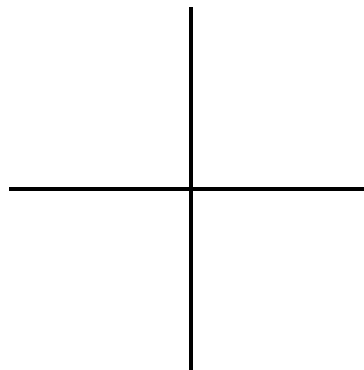


1. Graph and label each of the rational functions without use of graphing calculator
2. Answer the related questions to the given rational functions

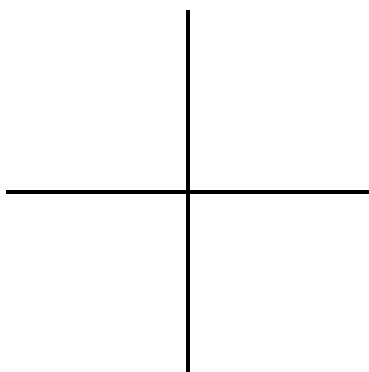
$$f(x) = \frac{2x+18}{x-4}$$



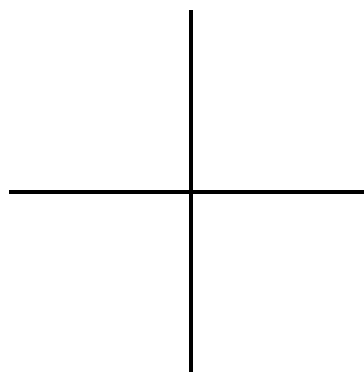
$$g(x) = \frac{x+9}{x-4}$$



$$h(x) = \frac{2x+18}{x^2-4}$$



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



1. Explain the similarity and difference between $f(x)$ and $g(x)$
2. Explain the similarity and difference between $h(x)$ and $j(x)$
3. Which of the functions has a hole in its graph? Why does this function have a hole? How do you locate the hole?

$$f(x) = \frac{2x+18}{x-4}$$

$$g(x) = \frac{x+9}{x-4}$$

$$h(x) = \frac{2x+18}{x^2-4}$$

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

4. Which of these functions has a horizontal asymptote at the x axis? Explain how you knew this

5. Which of these functions has TWO vertical asymptotes? Explain how you knew this

6. Why don't any of these functions have a slant asymptote? Explain how you knew this

Review of synthetic division

$$k(x) = \frac{2x+10}{x-4} \text{ since } x-4 = 0 \text{ at } x = 4 \text{ we can use } 4 \text{ as the potential root of the expression for } k(x)$$

$$\begin{array}{r|rr} 4 & 2 & 10 \\ & & 8 \\ \hline & 2 & 18 \end{array}$$

This means that $k(x) = \frac{2x+10}{x-4}$ can be expressed using

$$k(x) = 2 + \frac{18}{x-4}$$

$k(x)$ has a horizontal asymptote at $y = 2$

$$p(x) = \frac{2x^2+7x-12}{x-4} \text{ since } x-4 = 0 \text{ at } x = 4 \text{ we can use } 4 \text{ as the potential root of the expression for } k(x)$$

$$\begin{array}{r|rrr} 4 & 2 & 7 & -12 \\ & & 8 & 60 \\ \hline & 2 & 15 & 48 \end{array}$$

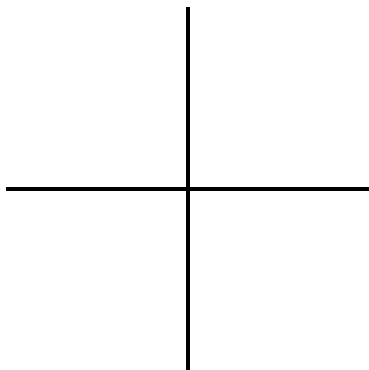
This means that $p(x) = \frac{2x^2+7x-12}{x-4}$ can be expressed

$$\text{using } p(x) = 2x+15 + \frac{48}{x-4}$$

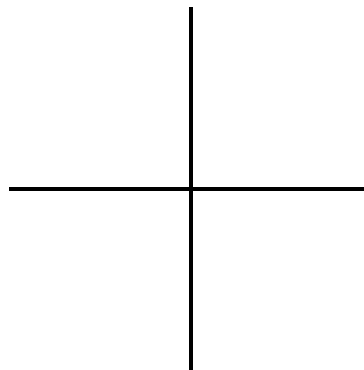
$p(x)$ has a slant asymptote at $y = 2x+15$

1. Graph and label each of the rational functions without use of graphing calculator
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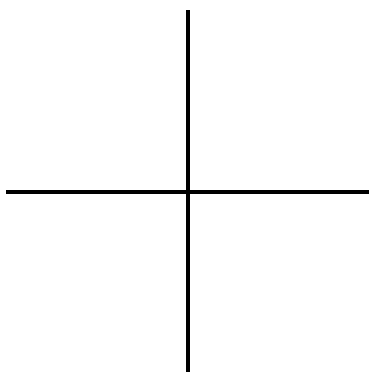
$$f(x) = \frac{2x-8}{x-4}$$



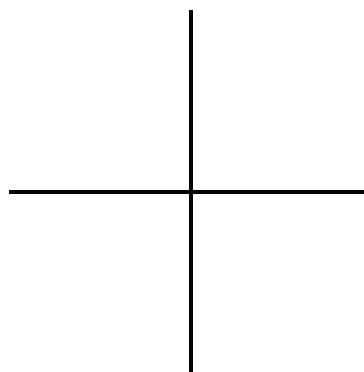
$$g(x) = \frac{x+8}{x-4}$$



$$h(x) = \frac{2x+18}{x^2-9}$$



$$j(x) = \frac{2x+6}{x^2-9}$$



1. Explain the similarity and difference between $f(x)$ and $g(x)$
2. Explain the similarity and difference between $h(x)$ and $j(x)$
3. Which of the functions has a hole in its graph? Why does this function have a hole? How do you locate the hole?

$$f(x) = \frac{2x-8}{x-4}$$

$$g(x) = \frac{x+8}{x-4}$$

$$h(x) = \frac{2x+18}{x^2-9}$$

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Review of synthetic division

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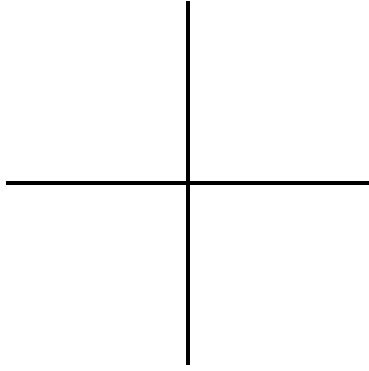
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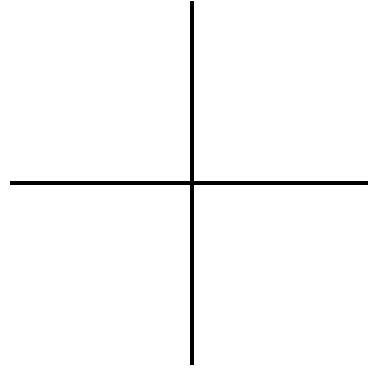
$p(x)$ has a slant asymptote at $y = 2x+15$

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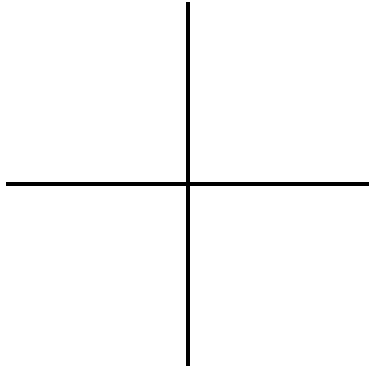
$$f(x) = \frac{2x+10}{x-6}$$



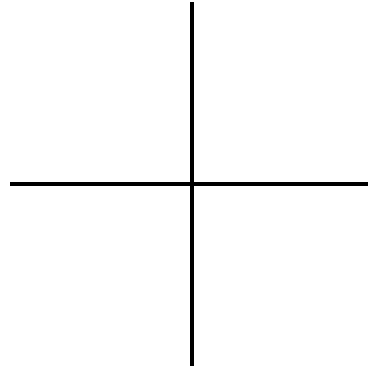
$$g(x) = \frac{x+5}{x-6}$$



$$h(x) = \frac{2x+24}{x^2-16}$$



$$j(x) = \frac{2x+8}{x^2-16}$$



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Review of synthetic division

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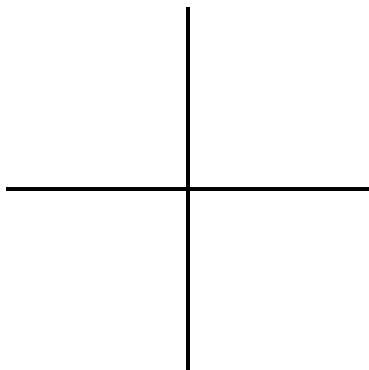
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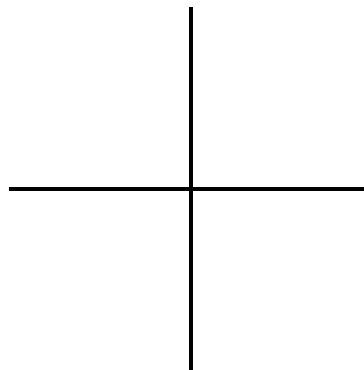
$p(x)$ has a slant asymptote at $y = 2x+15$

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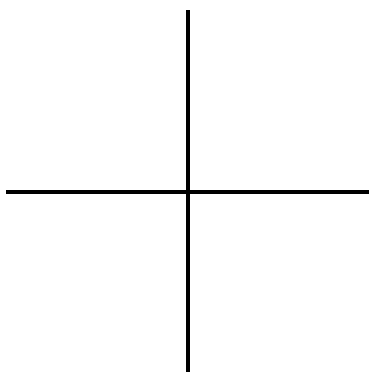
$$f(x) = \frac{3x+18}{x-5}$$



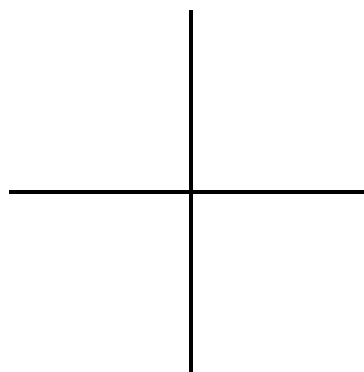
$$g(x) = \frac{x+6}{x-5}$$



$$h(x) = \frac{3x+18}{x^2-25}$$



$$j(x) = \frac{3x+15}{x^2-25}$$



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