

4.4 Graphing Rational Functions

If the Rational function is in the form $y = \frac{a}{b(x-c)} + d$, we can transform a reciprocal function

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

Otherwise:

Step 1: Find horizontal asymptote (if it exists), indicate with a dotted line

Step 2: Factor the function and simplify

Step 3: Find holes

Step 4: Find vertical asymptote(s), indicate with dotted line(s)

Step 5: Find x- and y-intercepts

Step 6: Use a table of value:

a.) determine the end behaviours by using a large value of x (>10 or <-10)

b.) determine values on either side of vertical asymptotes

c.) Find values that appear to be max or mins

Step 7: Sketch a smooth curve through the points

Example 1: Sketch the following:

a.) $f(x) = \frac{2}{1-x}$

b.) $j(x) = \frac{4x+4}{x-3}$

c.) $h(x) = \frac{x}{x^2+2x+1}$

d.) $g(x) = \frac{x^2-5x+6}{x^2-2x+1}$

e.) $k(x) = \frac{x^2-9}{x^2+x-2}$

f.) $m(x) = \frac{-x^2+3x-2}{x-2}$

g.) $n(x) = \frac{x-2}{x^2-5x+6}$