

1.) Let $f(x) = x^2 - 3$ and let $g(x) = \frac{1}{x^2} - 7$. Find the formulas for $(f \circ g)(x)$ and $(g \circ f)(x)$

$$f(g(x)) = g^2 - 3 = \left(\frac{1}{x^2} - 7 \right)^2 - 3$$

$$g(f(x)) = \frac{1}{f^2} - 7 = \frac{1}{(x^2 - 3)^2} - 7$$

2.) Suppose $h(x) = \sqrt[4]{x^2 + \frac{3}{x}}$ identify how h is formed as the composite of functions g and f . In particular, find formulas for $f(x)$ and $g(x)$ such that $h = g \circ f$.

inside function: $f(x) = x^2 + \frac{3}{x}$

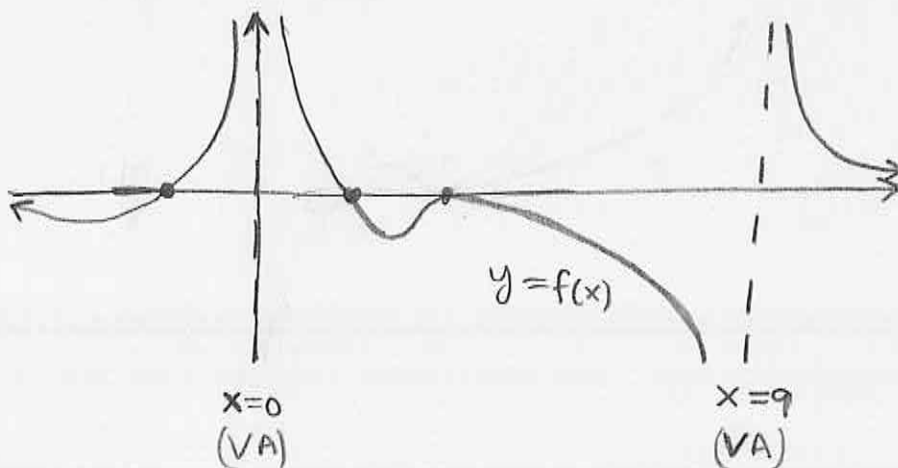
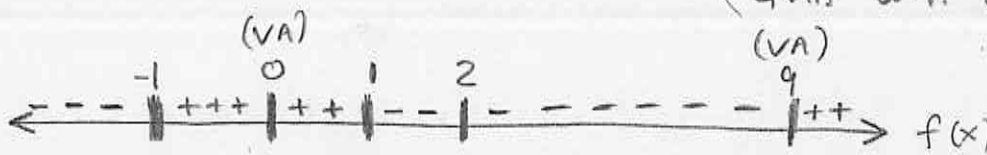
outside: $g(x) = \sqrt[4]{x}$

$$h(x) = g(f(x)) = \sqrt[4]{f} = \sqrt[4]{x^2 + \frac{3}{x}}$$

3.) Graph $y = f(x)$ where $f(x) = p(x)/q(x)$ and $p(x) = (x-2)^2(x^2-1)$ and $q(x) = (x^2+4x+5)(x^3-9x^2)$. Your graph should include labels for Vertical Asymptotes (VA) and x-intercepts. Please make a sign-chart to help guide your work.

$$f(x) = \frac{(x-2)^2(x^2-1)}{(x^2+4x+5)(x^3-9x^2)} = \frac{(x-2)^2(x+1)(x-1)}{(x^2+4x+5)x^2(x-9)}$$

(irred. $b^2 - 4ac = 16 - 20 < 0$
this will not factor over \mathbb{R} .)



Remark:
 $4 = \deg(P) < \deg(Q) = 5$
 tell us
 $y \rightarrow 0$
 as $x \rightarrow \infty$
 or $x \rightarrow -\infty$.