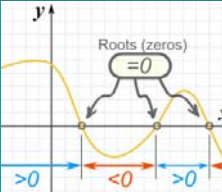


Unit 3 Polynomial, Radical, and Rational Functions

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3.9 Analyzing Rational Functions

Point of Discontinuity: "hole in the graph," a point on the graph that is not continuous that occurs when the rational is simplified by cancelling a term with a variable

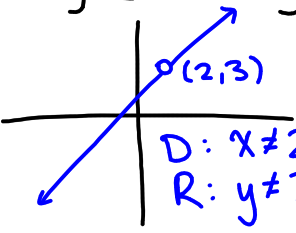
eg.) $y = \frac{x^2 - x - 2}{x - 2}$


$y = \frac{(x-2)(x+1)}{(x-2)}$ ← Point of Discontinuity @ $x=2$

$y = x+1$

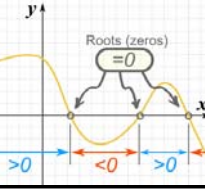
$(2, 3)$

D: $x \neq 2, x \in \mathbb{R}$
R: $y \neq 3, y \in \mathbb{R}$





Unit 3 Polynomial, Radical, and Rational Functions



Ex.) Determine the asymptotes, the x, y-intercepts, and the point of discontinuity for the following:

a) $y = \frac{x^2 - 5x + 6}{x - 3}$

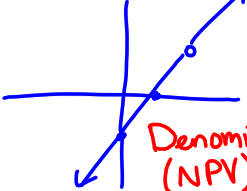
x -int: $0 = x^2 - 5x + 6 \Rightarrow x = 2, 3$
 y -int: $(0, -2)$
 VA & HA do not occur


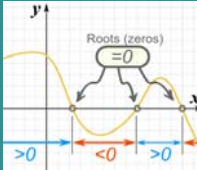
$y = \frac{(x-3)(x-2)}{(x-3)} \rightarrow$ PoD $x=3$
 $y = x-2$
 Point of Discontinuity: $(3, 1)$

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

x -int: $0 = \frac{x}{-2} \Rightarrow x = 0$
 y -int: $y = \frac{0}{-2} = 0$
 No VA or HA

$y = \frac{x(x-2)}{-2(-2+x)} = \frac{x}{-2}$
 Point of Discontinuity: $(2, -1)$



c) $y = \frac{x^2 + 7x + 6}{x^2 + 8x + 12}$

POB D
 $x = -6$
 $y = \frac{-6+1}{-6+2} = \frac{-5}{-4} = 5/4$
 $(-6, 5/4)$

VA
 $x+2=0$
 $x=-2$
HA
 $y=1$

X-int
 $0 = \frac{x+1}{x+2}$
 $0 = x+1$
 $(-1, 0)$

Y-int
 $y = \frac{0+1}{0+2}$
 $(0, 1/2)$

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

d) $y = \frac{2x^2 - 15x + 7}{x - 7}$

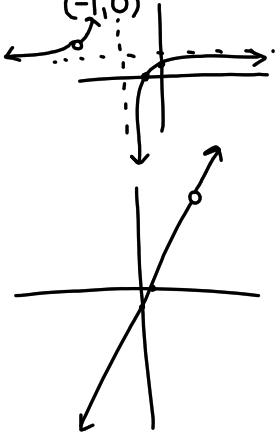
No VA, No HA

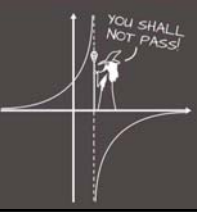
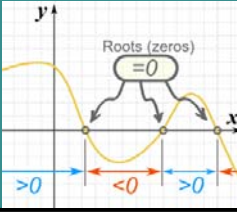
POB D
 $x = 7$
 $y = 2(7) - 1 = 13$
 $(7, 13)$

X-int
 $0 = 2x - 1$
 $x = 1/2$
 $(1/2, 0)$

Y-int
 $(0, -1)$

$y = 2x - 1$



Ex.) Determine the equation in factored form of the rational functions with HA $y = 2$, VA $x = 0$, and point of discontinuity $(1, 5)$.

VA: $x = 0$ ✓

POB D: $(1, 5)$
 ↑
 $(x-1)$ cancelled

HA: $y = 2$ ✓

$f(x) = \frac{(2x+b)(x-1)}{x(x-1)}$

$5 = \frac{2(1)+b}{1}$

$5 = 2 + b$

$f(x) = \frac{(2x+3)(x-1)}{x(x-1)}$ $b = 3$

Pg. 451 # 4, 8ab, 9.