

Rational Functions

Poly Numerator Zeros (ZN) Degree DN LI
 Poly Denominator Zeros (ZD)

Zeros of Rational = ZN

Vertical Asymptote = ZD

LND Behavior

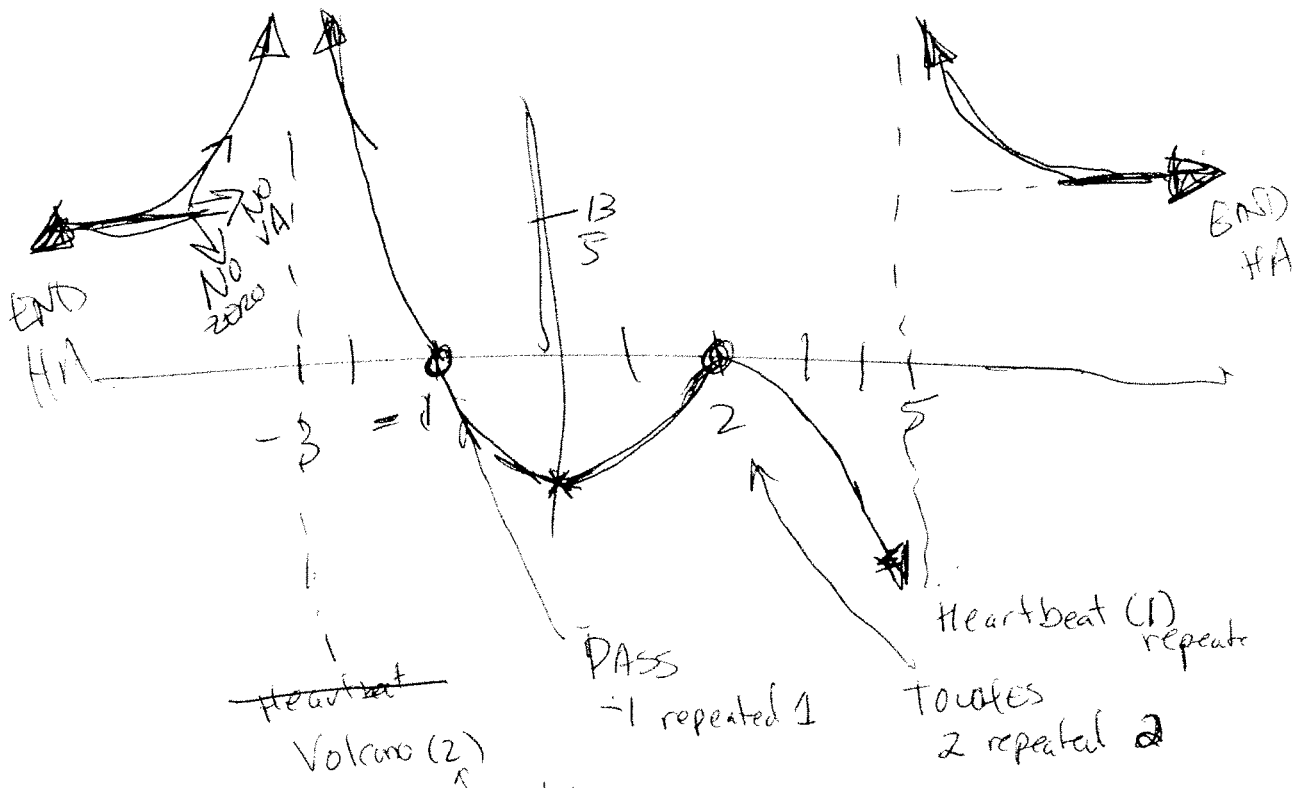
$$\begin{aligned} DN &= 3 \\ DD &= 3 \end{aligned}$$

$$HA = \frac{LN}{LD} = \frac{13}{5}$$

Ex

$$y = \frac{13(x-2)^2(x+1)}{5(x+3)^2(x-5)}$$

Zeros
 $ZN = 2, -1$
 V.A
 $ZD = -3, 5$



Ex

$$y = \frac{13(x-2)^2(x+3)^1}{5(x-7)^3(x+1)^2}$$

ZN: 2, -3
ZD: 7, -1

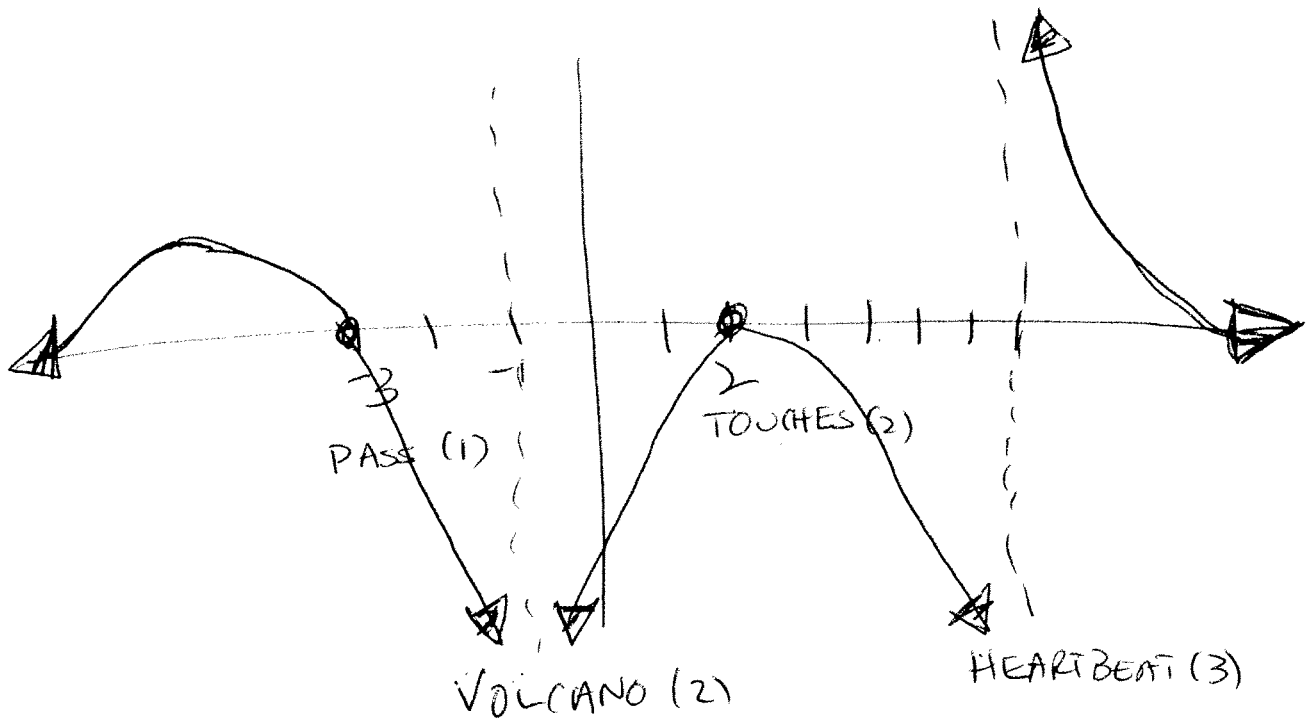
Zeros of y : 2, -3

Vertical Asym : 7, -1

END
DN: 3
DD: 5

DD > DN

$y = 0$



$$y(-4) = \frac{13(-6)^2(-1)^1}{5(-11)^3(-3)^2} = \oplus$$

Ex $y = \frac{-3(x-4)^7}{5(x+2)^3}$

$zN = 4$

$zD = -2$

Zeros of y : 4

VA: -2

END Behavior

DN: 7

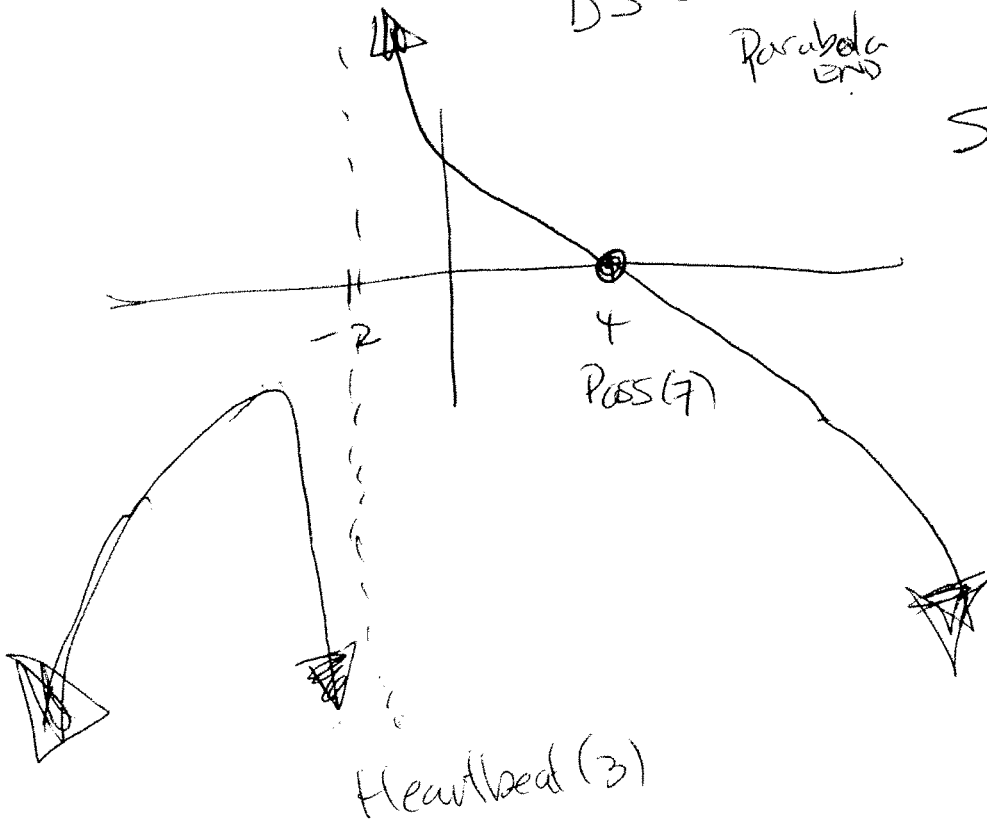
DD: 3

DS = 7 - 3 = 4

Parabola END

LS = $\frac{LN}{LD} = \frac{-3}{5}$

SAD $\rightarrow \ominus$



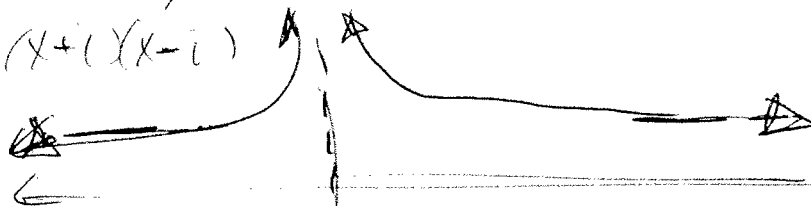
Ex

$y = \frac{x^2 + 1}{x^2}$

zN : No Real

zD : 0

$(x+i)(x-i)$



No Zeros
VA: $x = 0$

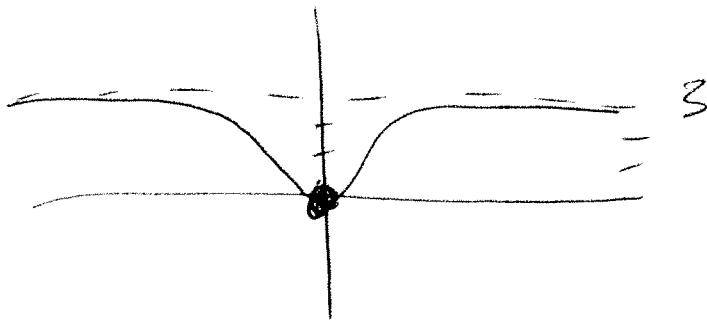
END Behavior

DN: 2

DD: 2

HA: $y = \frac{1}{1} = 1$

Ex



zero: $x=0$

$$\underline{x^2}$$

HA: $y=3$

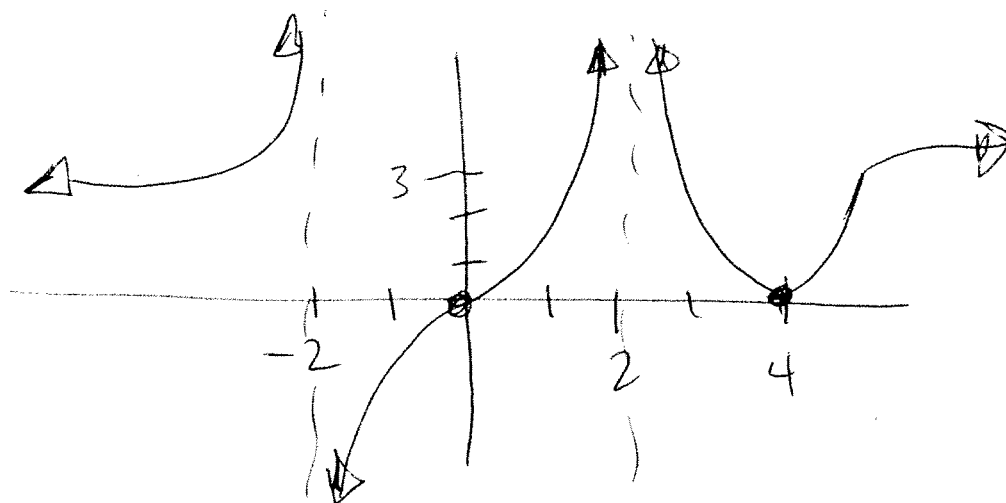
DN=DN

LN=3 LD=1

$$y = \frac{3x^2}{x^2 + 4} \quad \leftarrow \text{NO Real Zeros}$$

$(x+2i)(x-2i)$

Ex



Zeros: 0, 4

VA: $x=-2, 2$

$$y = \frac{3(x)(x-4)}{(x+2)(x-2)^2}$$