

Day 1 Practice

name Kelly

HWK Rationals 2.6

Asymptotes and Holes

Decide if the following have removable discontinuities, vertical asymptotes, horizontal asymptotes, or slant asymptotes. If they do, find them, showing all work.

1. $f(x) = \frac{x-1}{x+2}$ *WOCO* $\frac{1}{1} = 1$

RD?	<u>none</u>
VA?	<u>$x = -2$</u>
HA?	<u>$y = 1$</u>
SA?	<u>none</u>

2. $f(x) = \frac{(x+1)(x-1)}{x^2-1} \rightarrow \frac{x-1}{x+1}$ *WOCO* $\frac{1}{1}$

RD?	<u>$(-1, @ \text{asymptote})$</u>
VA?	<u>$x = -1$</u>
HA?	<u>$y = 1$</u>
SA?	<u>none</u>

$f(-1) = \frac{-1-1}{-1+1} = \frac{-2}{0}$

3. $f(x) = \frac{x^3-8}{x^2-4} \rightarrow \frac{(x-2)(x^2+2x+4)}{(x+2)(x-2)}$

RD?	<u>$(2, 3)$</u>
VA?	<u>$x = -2$</u>
HA?	<u>none</u>
SA?	<u>$y = x$</u>

$\frac{x^2+2x+4}{x+2}$

BOTN by 1

$x+2 \overline{) x^2+2x+4}$
 $\underline{-(x^2+2x)}$
 4

$f(2) = \frac{2^3+2(2)+4}{2(2)} = \frac{12}{4} = 3$

4. $f(x) = \frac{3}{x^2-9} \rightarrow \frac{3}{(x+3)(x-3)}$ *BOBO*

RD?	<u>none</u>
VA?	<u>$x = 3, x = -3$</u>
HA?	<u>$y = 0$</u>
SA?	<u>none</u>

5. $f(x) = \frac{x^2-6x+8}{x^2-x} \rightarrow \frac{(x-2)(x-4)}{x(x-1)}$ *WOCO* $\frac{1}{1} = 1$

RD?	<u>none</u>
VA?	<u>$x = 0, x = 1$</u>
HA?	<u>$y = 1$</u>
SA?	<u>none</u>

6. $f(x) = \frac{x}{x^2+1}$ *BOBO*

RD?	<u>none</u>
VA?	<u>none</u>
HA?	<u>$y = 0$</u>
SA?	<u>none</u>

imaginary VA

7. $f(x) = \frac{x^2}{x+1}$

BOTN

RD?	none
VA?	$x = -1$
HA?	none
SA?	$y = x - 1$

$x+1 \overline{) x^2 + 0x + 0}$
 $\ominus x^2 + x$
 $\hline \ominus -x - 1$

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

RD?	$(2, 4)$
VA?	none
HA?	none
SA?	none

$\rightarrow x+2$

$f(2) = 2+2 = 4$
 Hole @ $(2, 4)$

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

B0B0

RD?	$(1, 0)$
VA?	$x = -1$
HA?	$y = 0$
SA?	none

$\rightarrow \frac{2(x-1)(x+1)}{(x^2+1)(x+1)(x-1)}$

$f(1) = \frac{2(1-1)}{(1^2+1)(1+1)}$
 $= \frac{0}{4} = 0$
 Hole @ $(1, 0)$

10. $f(x) = \frac{x^2 - 4}{3x^2 - 5x - 2}$

RD?	$(2, 4/7)$
VA?	$x = -1/3$
HA?	$y = 1/3$
SA?	none

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

$\frac{x+2}{3x+1}$

$\frac{1}{3}$

$f(2) = \frac{2+2}{3(2)+1} = \frac{4}{7}$
 Hole @ $(2, 4/7)$