$3(-5)^2+15(-5)$

$75+(-75)$

Determine if each function is continuous. If the function is not continuous, find the x-axis location of each discontinuity and classify each discontinuity as infinite or removable. Also find any horizontal asymptotes.

V.A. Hole

A) $f(x)=\frac{3x^2+15x}{x+5}$

Discontinious @ $x=-5$

Hole $x=-5$

H.A. None

B) $f(x)=\frac{x^2+3x}{x+2}$

P.O.D $x=-2$

$x=-2 \rightarrow$ V.A.

H.A. None

C) $f(x)=\frac{9x+6}{x^2-4}$

P.O.D. $x=\pm 2$

V.A. $x=\pm 2$

H.A. $y=0$

D) $f(x)=\frac{9x+18}{x^2-4}$

P.O.D $x=\pm 2$

V.A. $x=2$

Hole $x=-2$

H.A. $y=0$

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

P.O.D= $x=5,-1$

Hole $x=5$

V.A $x=-1$

HA $y=0$

Identify each point of discontinuity, holes, vertical asymptote, horizontal asymptote, zero(s), y-intercept, domain, and range.

$X-4=0$
$X=4$

$-4x-16=0$

$f(x)=\frac{x-4}{-4x-16}$

Zeros: $X=4$

y-intercepts: $\frac{0-4}{-4(0)-16}=\frac{-4}{-16}=\frac{1}{4}$
$(0,\frac{1}{4})$

Points of Discontinuity:
$X=-4$

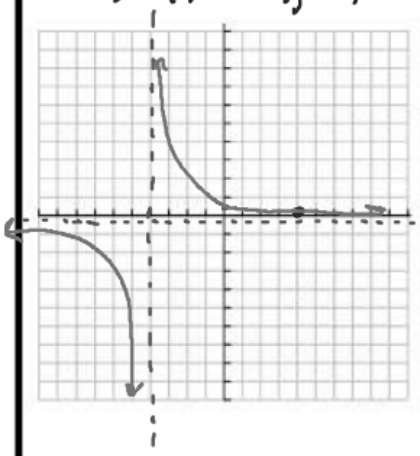
Hole: None

Vertical Asymptote:
$X=-4$

Horizontal Asymptote:
$Y=-\frac{1}{4}$

Domain:
$(-\infty,-4)\cup(-4,\infty)$

Range:
$(-\infty,-\frac{1}{4})\cup(-\frac{1}{4},\infty)$



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

$X^2-3x=0$
$X(x-3)=0$

Zeros: None

y-intercepts: $\frac{4}{0^2-3(0)}=\frac{4}{0}$
None

Points of Discontinuity:
$X=0,3$

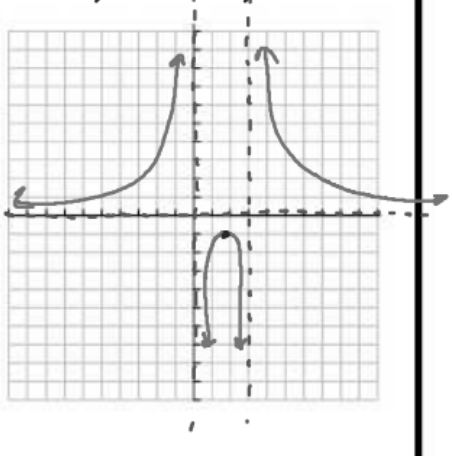
Hole: None

Vertical Asymptote:
$X=0,3$

Horizontal Asymptote:
$Y=0$

Domain:
$(-\infty,0),(0,3)\cup(3,\infty)$

Range:
$(-\infty,$ Local max$)\cup(0,\infty)$



$0 = x^3 - 9x$

$x(x^2-9)$

$x(x-3)(x+3)$

$3x^2-6x-9=0$

$x^2-2x-3=0$

$(x-3)(x+1)$

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

$\frac{x(x+3)}{3(x+1)}$ $\frac{18}{12}$

$f(x) = \frac{x^3-9x}{3x^2-6x-9}$

Zeros:

$x = 0, -3, 3$

y-intercepts:

$(0,0)$

Points of Discontinuity:

$x = -1, 3$

Hole:

$x = 3$

Vertical Asymptote:

$x = -1$

Horizontal Asymptote:

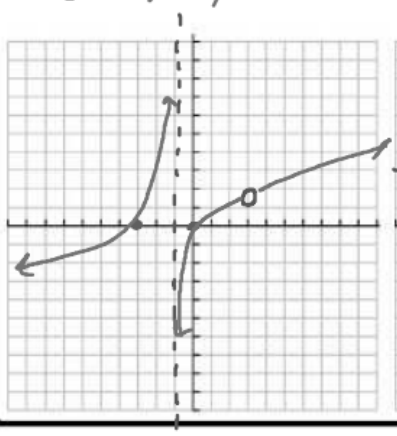
None

Domain:

$(-\infty,-1) \cup (-1,3) \cup (3,\infty)$

Range:

$(-\infty,\infty)$



$f(x) = \frac{3x^2-12x}{x^2-2x-3}$ $\frac{3x(x-4)}{(x-3)(x+1)}$

Zeros:

$x = 0, 4$

y-intercepts:

$(0,0)$

Points of Discontinuity:

$x = 3, -1$

Hole:

None

Vertical Asymptote:

$x = -1, 3$

Horizontal Asymptote:

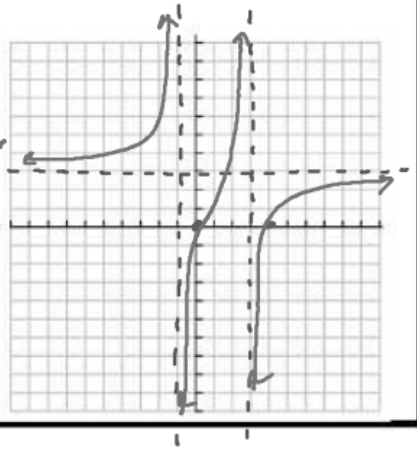
$y = 3$

Domain:

$(-\infty,-1) \cup (-1,3) \cup (3,\infty)$

Range:

$(-\infty,\infty)$



$\lim_{x \to \infty} f(x) = 3$

$x^3 - 16x = 0$

$x(x^2 - 16)$

$x(x-4)(x+4)$

$-4(x^2 - x - 6)$

$-4(x-3)(x+2)$

$x = 3, x = -2$

$f(x) = \frac{x^3 - 16x}{-4x^2 + 4x + 24}$

Zeros: $x = 0, \pm 4$

y-intercepts:

$\frac{0}{24} = (0,0)$

Points of Discontinuity:

$x = 3, -2$

Hole:

None

Vertical Asymptote:

$x = -2, 3$

Horizontal Asymptote:

None

Domain:

$(-\infty, -2) \cup (-2, 3) \cup (3, \infty)$

Range:

$(-\infty, \infty$

$f(x) = \frac{2x^2 + 10x + 12}{x^2 + 3x + 2}$ $\frac{2(x+3)(x+2)}{(x+2)(x+1)}$

Zeros:

$x = -3$

y-intercepts:

$(0, 6)$

Points of Discontinuity:

$x = -2, -1$

Hole:

$x = -2$

Vertical Asymptote:

$x = -1$

Horizontal Asymptote:

$y = 2$

Domain:

Range: