Using limits to identify asymptotes assignment Name: _____

For each function:

1. Identify any domain restrictions. At these restrictions, find the x value of any holes and /or the equations of any vertical asymptotes.
2. Use the concept of limits at infinity to determine whether there is a horizontal or slant asymptotes. Find the equation of this asymptote.

1. $f(x)=\dfrac{x^3-x^2-6x}{-3x^2-3x+18}$

$\dfrac{x(x-3)(x+2)}{-3(x+3)(x-2)}$

$-3x^2-3x+18 \;\overline{)\; x^3-x^2-6x+0}$ $\quad -\frac{1}{3}x+\frac{2}{3}$

x^3+x^2-6x

$-2x^2+0x+0$

Vertical asymptotes

$x=-3$

$x=2$

slant asymptote

$y=-\frac{1}{3}x+\frac{2}{3}$

2. $f(x)=\dfrac{x+4}{-2x-6}$

$\dfrac{x+4}{-2(x+3)}$

vertical asymptote

$x=-3$

horizontal asymptote

$y=-\frac{1}{2}$

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

$\dfrac{x(x-4)(x+4)}{-4(x-3)(x+2)}$

$-4x^2+4x+24 \;\overline{)\; x^3+0x^2-16x+0}$ $\quad -\frac{1}{4}x-\frac{1}{4}$

x^3-x^2-6x

$x^2+22x+0$

vertical asymptotes

$x=3 \quad x=-2$

slant asymptote

$y=-\frac{1}{4}x-\frac{1}{4}$

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

$-\dfrac{4}{x(x-3)}$

vertical asymptotes

$x=0$

$x=3$

horizontal asymptotes

$y=0$