

Quiz 5

NAME:

PERM:

SECTION: T 8 AM / T 4 PM / T 5 PM / T 6 PM / TH 6 PM

1. Find all vertical and horizontal asymptotes for the function

$$f(x) = \frac{-7x}{1+x}$$

• For horizontal asymptotes we find $\lim_{x \rightarrow \pm\infty} f(x)$:

$$\lim_{x \rightarrow \infty} \frac{-7x}{1+x} \cdot \frac{\frac{1}{x}}{\frac{1}{x}} = \lim_{x \rightarrow \infty} \frac{-7}{\frac{1}{x}+1} = -7 \quad \text{and}$$

$\lim_{x \rightarrow -\infty} \dots = -7$, so the line $y = -7$ is the only horizontal asymptote for $f(x)$.

• For vertical asymptotes, we find when $\lim_{x \rightarrow a} f(x) = \pm\infty$

This only happens when $x \rightarrow -1$: $\lim_{x \rightarrow -1^+} \frac{-7x}{1+x} = \infty$ (a positive number divided by a positive number approaching 0)
so the line $x = -1$ is a vertical asymptote for $f(x)$.

(You could have similarly found $\lim_{x \rightarrow -1^-} f(x) = -\infty$)

2. If $g(x) = 3x^2 + 2x - 10$, find $g'(x)$. What is $g'(2)$?

$$g'(x) = 3 \cdot 2x + 2 = 6x + 2$$

$$g'(2) = 6(2) + 2 = 14.$$