Section 3.5

Definition of a Horizontal Asymptote: The line $y = L$ is a **horizontal asymptote** of the graph of f when

$$\lim_{x\to-\infty} f(x) = L \qquad \text{or} \qquad \lim_{x\to\infty} f(x) = L$$

Limits at Infinity: If r is a positive rational number and c is any real number, then

$$\lim_{x\to\infty} \frac{c}{x^r} = 0.$$

Furthermore, if x^r is defined when $x < 0$, then

$$\lim_{x\to-\infty} \frac{c}{x^r} = 0.$$

1) Find the limit: $\lim_{x\to\infty} \left(6 + \frac{3}{x^4}\right)$

2) Find the limit: $\lim_{x\to\infty} \frac{8x+3}{2x-7}$

3) Find each limit.

   a) $\lim_{x\to\infty} \frac{x-3}{4x^2+5}$

   b) $\lim_{x\to\infty} \frac{x^2-3}{4x^2+5}$

   c) $\lim_{x\to\infty} \frac{x^3-3}{4x^2+5}$

4) Find each limit.

a) $\lim_{x\to\infty} \frac{2x-5}{\sqrt{3x^2+2}}$

b) $\lim_{x\to-\infty} \frac{2x-5}{\sqrt{3x^2+2}}$

5) Find each limit.

a) $\lim_{x\to\infty} \cos x$

b) $\lim_{x\to\infty} \frac{\cos x}{x}$

6) Find the limit: $\lim_{t\to\infty} \frac{2t^2+3t-3}{t^2+4t+6}$

7) Find the limit: $\lim_{x\to\infty} \frac{3x^2-2x-10}{x-3}$

Homework for this section: Read the section and watch the videos/tutorials. Then do these problems in preparation for the quiz: #9, 13, 17, 29, 45