AP Calculus
2.2 Worksheet

*All work must be shown in this course for full credit. Unsupported answers may receive NO credit.*

1. Sketch a **function** that satisfies the stated conditions. Include any asymptotes.

$\lim_{x\to 1} f(x) = 2$ $\lim_{x\to 5^-} f(x) = \infty$

$\lim_{x\to 5^+} f(x) = \infty$ $\lim_{x\to \infty} f(x) = -1$

$\lim_{x\to -\infty} f(x) = 0$ $\lim_{x\to -2^-} f(x) = \infty$

$\lim_{x\to -2^+} f(x) = -\infty$

2. Sketch a **function** that satisfies the stated conditions. Include any asymptotes.

$\lim_{x\to 2} f(x) = -1$ $\lim_{x\to 4^+} f(x) = -\infty$

$\lim_{x\to 4^-} f(x) = \infty$ $\lim_{x\to \infty} f(x) = \infty$

$\lim_{x\to -\infty} f(x) = 2$

3. Answer the following questions:

a) How do you find horizontal asymptotes?

b) Which one of the parent functions have horizontal asymptotes? List the function(s) and asymptote(s)

c) How do you find vertical asymptotes?

d) Which one of the parent functions have vertical asymptotes? List the function(s) and asymptote(s)

e) When must you look for oblique (slanted) asymptotes? How do you find them?

4. Explain why there is no value $L$ for which $\lim_{x\to\infty} \sin x = L$.

5. Let $f(x)=\dfrac{\cos x}{x}$.

a) Find the domain and range of $f$.

b) Is $f$ even, odd, or neither? Justify your response.

c) Find $\lim\limits_{x\to\infty} f(x)$. Give a reason for your answer.

6. If $k$ is a positive integer, then $\lim\limits_{x\to\infty}\dfrac{x^k}{e^x}=$ ? Explain your answer.

7. Evaluate the following limits:

a) $\lim\limits_{x\to\infty}\dfrac{4n^3}{n^2+10000n}=$

b) $\lim\limits_{n\to\infty}\dfrac{3n^3-5n}{n^3-2n^2+1}=$

c) $\lim\limits_{x\to\infty}\left(5-\dfrac{2}{x^2}\right)=$

d) $\lim\limits_{x\to\infty}\left(\dfrac{2}{x}+1\right)\left(\dfrac{5x^2-1}{x^2}\right)$

e) $\lim\limits_{x\to\infty}\dfrac{x\sin x+2\sin x}{2x^2}$

f) $\lim\limits_{x\to\infty}\dfrac{\cos\left(\frac{1}{x}\right)}{1+\frac{1}{x}}$

8. Investigate $\lim\limits_{x\to\infty}\dfrac{3x-2}{\sqrt{2x^2+1}}$ and $\lim\limits_{x\to-\infty}\dfrac{3x-2}{\sqrt{2x^2+1}}$

9. Complete the following questions from the textbook: page 76 #3, 7, 15, 20, 25, 27, 30, 39, 41, 42, 43, 53, and 54