AP Calculus
2.1 Worksheet

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

1. Describe the different ways you can ***investigate*** the existence of a limit.

2. What are the methods of ***finding*** (proving) the existence of a limit.

3. How can you find the average speed of an object?

4. Suppose an object moves along the *x*-axis with it's position function given by $x(t) = 5t^2 + 7t$, where *t* is measured in seconds.

   a) What is the average speed from *t* = 2 to *t* = 4 seconds?

   b) How fast is the object moving at exactly *t* = 4 seconds?

5. If a limit does not exist, there are 3 possible reasons why. List all three possible reasons why a limit may not exist.

6. Evaluate the following limits algebraically.

   a) $\lim_{x\to 7} \sec\left(\frac{\pi x}{6}\right)$

   b) $\lim_{x\to 4} \sqrt[3]{x+4}$

   c) $\lim_{x\to 0} \frac{\frac{3}{4+x} - \frac{3}{4}}{x}$

   d) $\lim_{x\to 0} \frac{\sqrt{2x+1} - 1}{x}$

e) $\lim_{x\to 0}\dfrac{\tan x}{x}$

f) $\lim_{x\to \pi/4}\dfrac{\sin\left(x-\pi/4\right)}{x-\pi/4}$

7. If $f(x)=2x^2+1$, then $\lim_{x\to 0}\dfrac{f(x)-f(0)}{x^2}=$

8. If $f(x)=\begin{cases}\ln x & \text{for } 0<x\le 2\\ x^2\ln x & \text{for } 2<x\le 4\end{cases}$, then $\lim_{x\to 2} f(x)=$

9. If $a\neq 0$, then $\lim_{x\to a}\dfrac{x^2-a^2}{x^4-a^4}=$

10. Find $\lim_{x\to 3}\dfrac{x^2-x-6}{x-3}$, if it exists.

A) –1 B) 1 C) 2 D) 5 E) does not exist

11. Find $\lim_{x\to 2^+} f(x)$, if it exists, where $f(x)=\begin{cases}3x+1 & ,x<2\\ \dfrac{5}{x+1} & ,x\ge 2\end{cases}$

A) 5/3 B) 13/3 C) 7 D) ∞ E) does not exist

12. Complete the following questions from the textbook: page 66 – 68 #5, 11, 13, 15 – 30, 38, 39, 42, 44, 50, 51 – 54, 57, 63, and 64