AP Calculus
2.3 Worksheet

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

1. What is the definition of continuity?

2. Sketch a possible graph for each function described.

   a) $f(5)$ exists, but $\lim_{x\to 5} f(x)$ does not exist.

   b) The $\lim_{x\to 5} f(x)$ exists, but $f(5)$ does not exist.

3. If $f(x)=\begin{cases}\dfrac{\sqrt{2x+5}-\sqrt{x+7}}{x-2} & \text{if } x\neq 2\\ k & \text{if } x=2\end{cases}$, and if f is continuous at $x = 2$, then k = ? Justify your response.

4. Let $f(x)=\begin{cases}x^2-a^2x & ;x<2\\ 4-2x^2 & ;x\geq 2\end{cases}$. Find all values of a that make f continuous at 2. Justify your response.

5. Let f be the function defined by the following:

$$f(x)=\begin{cases}\sin x, & x<0\\ x^2, & 0\le x<1\\ 2-x, & 1\le x<2\\ x-3, & x\ge 2\end{cases}$$

For what values of x is f NOT continuous?

6. If the function f is continuous for all real numbers and if $f(x)=\dfrac{x^2-4}{x+2}$, when $x\neq -2$, then $f(-2)=$

7. Let f be the function given by $f(x)=\dfrac{(x-1)(x^2-4)}{x^2-a}$. For what positive values of a is f continuous for all real numbers?

A) None B) 1 only C) 2 only D) 4 only E) 1 and 4

8. Let $h(x)=\dfrac{x^2+5x+6}{x^2+7x+10}$.

a) Find the domain of $g(x)$.

b) Find the $\lim\limits_{x\to c} g(x)$ for all values of c where $g(x)$ is not defined.

c) Find any horizontal asymptotes and justify your response.

d) Find any vertical asymptotes and justify your response.

e) Write an extension to the function so that $g(x)$ is continuous at $x=-2$.

9. Without using a picture, give a <u>written</u> explanation of why the function $f(x)=x^2-4x+3$ has a zero in the interval [2, 4].

10. Complete the following questions from the textbook: page 84 – 86 #1, 7, 10, 11 – 22, 25, 28, 29, 47, 48, 58, 59