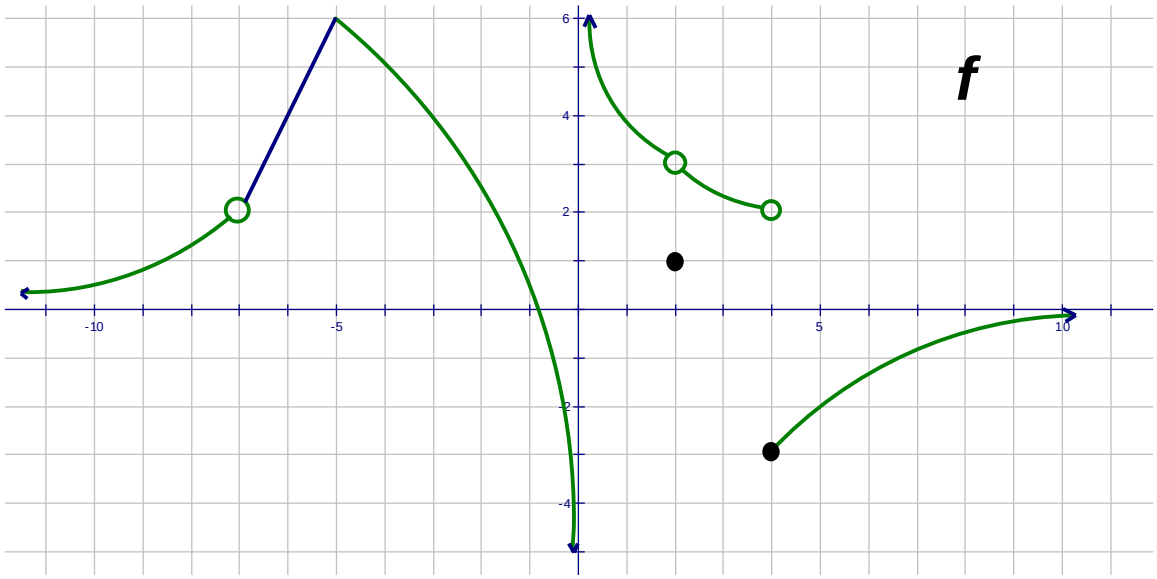
AP Calculus AB Name: _____

Unit 1 Review – LIMITS and CONTINUITY

PART I - DO NOT USE A CALCULATOR ON ANY PROBLEM IN THIS SECTION. (Problems 1-37)

Consider the graph of function, f, shown below.



Answer the following questions about function *f*.

1.) $f(-5) =$

2.) $f(2) =$

3.) $f(4) =$

4.) $\lim_{x \to -7} f(x) =$

5.) $\lim_{x \to -5} f(x) =$

6.) $\lim_{x \to 2} f(x) =$

7.) $\lim_{x \to 4} f(x) =$

8.) $\lim_{x \to 0} f(x) =$

9.) $\lim_{x \to 0^-} f(x) =$

10.) $\lim_{x \to 0^+} f(x) =$

11.) $\lim_{x \to 4^+} f(x) =$

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

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

14.) $\lim_{x \to \infty} f(x) =$

15.) Use the definition of a continuous function at a number to answer the following.
Be sure to use reasons based on the definition of continuity at a point that we discussed in class.

a.) f is not continuous at *x* = -7 because:_____

b.) f is not continuous at *x* = 2 because:_____

c.) f is not continuous at *x* = 4 because:_____

DO NOT USE A CALCULATOR

16.) $\lim_{x\to 2}\left(-x^2+4x\right)$	**17.)** $\lim_{x\to 9^-}\dfrac{\sqrt{x}-3}{x-9}$	**18.)** $\lim_{x\to 0}\dfrac{x}{\tan x}$
19.) $\lim_{x\to -2^+}\left(\dfrac{x}{x+2}\right)$	**20.)** $\lim_{x\to 0^-}\left(1+\dfrac{1}{x}\right)$	**21.)** $\lim_{x\to 1}\left(\sin \pi x\right)$
22.) $\lim_{x\to\infty}\dfrac{7-6x^5}{x+3}$	**23.)** $\lim_{t\to -\infty}\dfrac{6-t^3}{7t^3+3}$	**24.)** $\lim_{x\to -\infty}\dfrac{x-2}{x^2+2x+1}$
25.) $\lim_{y\to -\infty}\dfrac{2-y}{\sqrt{7+6y^2}}$	**26.)** $\lim_{x\to 2} f\left(x\right)$ when $f\left(x\right)=\begin{cases} x^2-3x+6, & \text{x} < 2 \\ -x^2+3x+2, & \text{x} \geq 2 \end{cases}$	**27.)** If a $\neq$ 0, then $\lim_{x\to -a}\dfrac{x^2-a^2}{x^4-a^4}$ is:

28.) Find a ***c*** such that $f(x)$ is continuous on the entire real line.

$$f(x)=\begin{cases} x^2 & \text{when} \quad x \le 4 \\ \dfrac{c}{x} & \text{when} \quad x > 4 \end{cases}$$

29.) Find the *x*-values (if any) at which *f* is discontinuous. Label as removable or non-removable.

$$f(x)=\frac{2x+6}{2x^2-18}$$

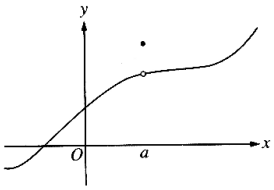
30.) Determine all of the vertical asymptotes of *f*(*x*):

$$f(x)=\frac{x+2}{x^2-4}$$

31.) True or False: If f is undefined at *x* = *c*, then the limit of *f*(*x*) as *x* approaches c does not exist.

32.) True or False: If the $\lim_{x\to c} f(x)=L$ then $f(c)=L$.

33.) The graph of the function *f* is shown to the right.
Which of the following statements is false?



a.) $x=a$ is in the domain of f

b.) $\lim_{x\to a^+} f(x)$ is equal to $\lim_{x\to a^-} f(x)$

c.) $\lim_{x\to a} f(x)$ exists

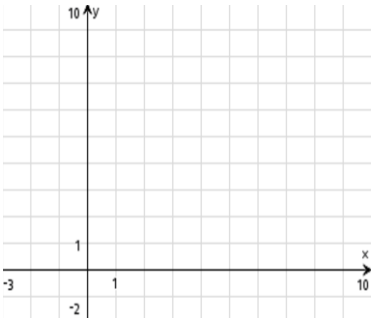
d.) $\lim_{x\to a} f(x)$ is not equal to $f(a)$

e.) f is continuous at $x=a$

34.) $\lim_{\Delta x\to 0} \dfrac{(x+\Delta x)^2-2(x+\Delta x)+1-(x^2-2x+1)}{\Delta x}$

35.) On the graph, draw a function that has the following properties:

- A step (or jump) discontinuity at x = 5
- *f*(5) = 6.



36.) Create a function such that the $\lim_{x\to 5}$ does not exist because it is approaching $+\infty$ from both the left and the right. Show both the function and the graph.

37.) Find a function *f*(*x*) such that *f*(*x*) has a hole at *x* = 7 and a vertical asymptote at *x* = -4.

Unit 1 (Topics 1.1-1.16) Review – LIMITS and CONTINUITY

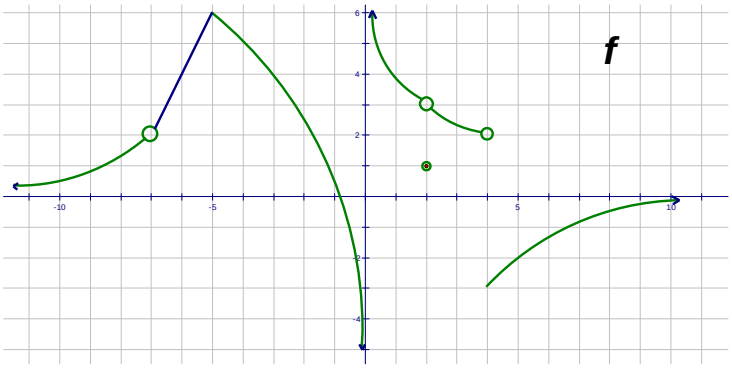
PART II - CALCULATORS MAY BE USED ON THE FIRST PART OF THIS SECTION.

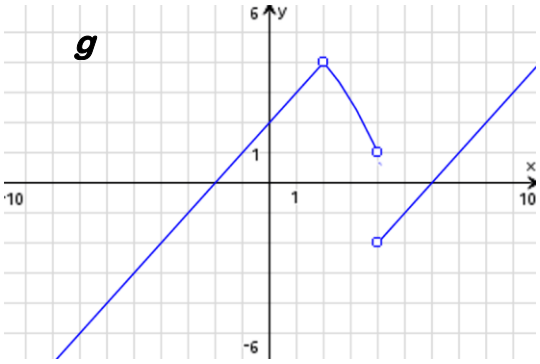
1.) Approximate the limit ***numerically*** by completing the table:

$$\lim_{x\to 2}\frac{x^2}{x-2} = \_\_\_\_\_$$

x	1.9	1.99	1.999	2	2.001	2.01	2.1
$f(x)$							

2.) Find the limit: $\lim_{x\to 0}\left(\cos\frac{1}{x}\right)$





3.) Find $\lim_{x\to 2} f(g(x))$

4.) $\lim_{x\to 1} f(x-1)\cdot g(x)$

5.) $\lim_{x\to 1^+}\frac{f(x+1)}{g(x+3)}$