Name:_____
AP Calc BC
Limits Review

Show your work

I. Determine the limit of the given function

1. $\lim_{x \to -3} (2x^2 - 5x - 4)^2$

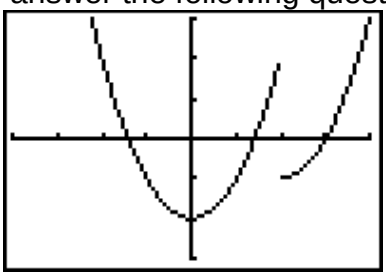
2. $\lim_{x \to -3} \frac{x^2 + 2x - 3}{(x + 3)^2}$

3. $\lim_{x \to 0} \frac{5^x - 5^{-x}}{5^x + 5^{-x}}$

4. $\lim_{x \to \infty} \frac{2x^5 - 6x^3 - 3x - 12}{-9x^5 + 4x^3 + x^2 - 2x}$

Name:_____
AP Calc BC
Limits Review

5. Use the graph of g(x) to answer the following questions



a. $\lim_{x \to 2^-} g(x)$

b. $\lim_{x \to 2^+} g(x)$

c. $\lim_{x \to 2} g(x)$

d. g(2) =

III. Find all numbers for which the function is not continuous. At each point(s) of discontinuity determine if the discontinuity is jump, infinite, or removable.

6. $f(x) = \dfrac{5}{x^2 - 4x - 21}$

7. $f(x) = \dfrac{x^2 - 2x - 3}{x^2 - x - 2}$

Name:_____
AP Calc BC
Limits Review

IV. Continuity

8. Given the function

$$f(x)\begin{cases} x^3-4, & if\ x\geq 1 \\ 3-x, & if\ x<1 \end{cases}$$

Determine whether the function is continuous at x = 1. Show your work.

9. Given the function

$$f(x) = \begin{cases} 2x^2 - 2x - 3 & \text{if } x \geq 2 \\ 3x + k & \text{if } x < 2 \end{cases}$$

Find the value of k which makes the function continuous. Show your work.

V. Applications

10. Draw a sketch of a function that satisfies all of the following conditions:

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

$\lim_{x\to -2^-} f(x) = \infty$ $\lim_{x\to -2^+} f(x) = \infty$ $\lim_{x\to 3^-} f(x) = 2$ $\lim_{x\to 3^+} f(x) = 4$

Name:_____
AP Calc BC
Limits Review

11. Given the function $f(x) = 3x^2 + 5x - 4$ at the point (2, 18)

a) Find the slope of the curve at the given point. Show your work that leads to the answer.

b) Write an equation for the tangent line at the given point.

c) Write an equation for the normal line at the given point.