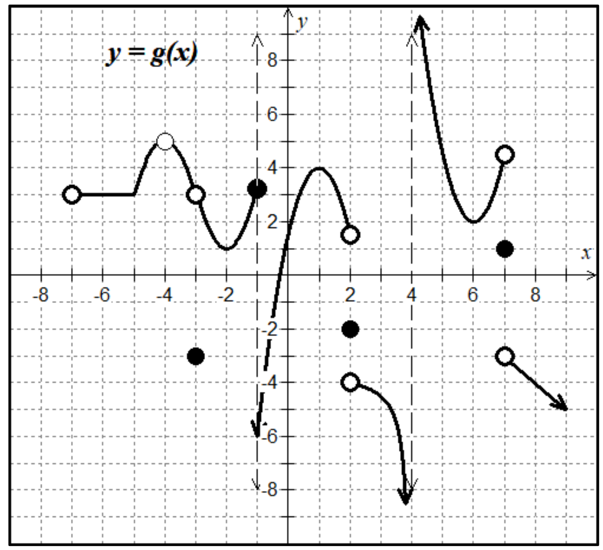
1.3 Day 1: Limits and Continuity Homework

Name ______________________

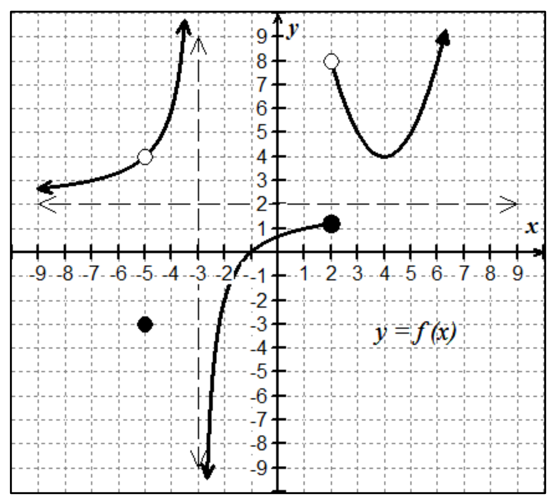
Date ______________ Period __________

1. Use the graph of the function $y = g(x)$ shown below, to evaluate each of the following.

A. $\lim_{x \to -3} g(x) =$	**B.** $\lim_{x \to -1^-} g(x) =$
C. $\lim_{x \to -1^+} g(x) =$	**D.** $g(-1) =$
E. $\lim_{x \to -1} g(x) =$	**F.** $\lim_{x \to 4^+} g(x) =$
G. $\lim_{x \to 4^-} g(x) =$	**H.** $\lim_{x \to 7} g(x) =$
J. $g(7) =$	**K.** $\lim_{x \to 2^+} g(x) =$



2. Use the graph of the function $y = f(x)$ shown below, to evaluate each of the following.



A. On the interval $x \in (-\infty, \infty)$, list the largest intervals for which $f(x)$ is continuous.

B. Find the smallest value k, such that the function is continuous on (k, ∞)

C. Find the smallest value k, such that the function is continuous on $[k, \infty)$

D. Find the largest value of b such that $y = f(x)$ is continuous on $(-3, b]$ but not continuous in $(-3, b + 1]$. State all values of b that would work.

Problem 3 – 6, determine the points, classify the type for each as removable, non-removable, jump, or infinite.

3. $f(x) = \dfrac{1}{(x-3)^2}$

4. $g(x) = \dfrac{x-4}{x^2 - 9x + 20}$

5. $h(x) = \dfrac{|x+2|}{x+2}$

6. $f(x) = \begin{cases} x+1 & x < 2 \\ -1 & x = 2 \\ x^2+1 & x > 2 \end{cases}$

Problems 7 – 8, use the three-part definition of continuity to determine if the given functions are continuous at the indicated values of *x*.

7. $f(x) = \begin{cases} e^x \cos x \,, & x \geq \pi \\ e^x \tan\left(\frac{3x}{4}\right), & x < \pi \end{cases}$ at $x = \pi$

8. $g(x) = \begin{cases} \frac{x^2-9}{x+3} & x \neq -3 \\ 5 & x = -3 \end{cases}$ at $x = -3$

Problems 9 – 12, find all value(s) of *a, b, c* or *k* that make the function continuous everywhere.

9. $f(x) = \begin{cases} kx^2 & x \leq 3 \\ 4x - 11 & x > 3 \end{cases}$

10. $g(x) = \begin{cases} cx^2 & x < 1 \\ 4 & x = 1 \\ -x^3 + kx & x > 1 \end{cases}$

11. $h(x) = \begin{cases} \pi & x < 0 \\ x^2 + ax + b & 0 \leq x \leq 1 \\ 6x + 5 & x > 1 \end{cases}$

12. $f(x) = \begin{cases} x^2 & x < 1 \\ \sin(bx) & x \geq 1 \end{cases}$

13. Consider the function $y = f(x)$ to answer the following. $f(x) = \begin{cases} -3 & x \le -1 \\ mx + k & -1 < x < 4 \\ 3 & x \ge 4 \end{cases}$

A. What two limits must be equal in order for the function to be continuous at $x = -1$?

B. What two limits must be equal in order for the function to be continuous at $x = 4$?

C. Find the values of m and k so that the function is continuous everywhere.

14. If $y = f(x)$ is continuous for all $x \neq \frac{1}{2}$, evaluate the following. $f(x) = \begin{cases} \dfrac{x^2 - x - 6}{2x^2 + 3x - 2}, & x \neq -2 \\ k\ , & x = -2 \end{cases}$

A. $\lim\limits_{x \to \frac{1}{2}^+} f(x) =$	**B.** $\lim\limits_{x \to 1} f(x) =$	**C.** What is the value of k ?