Limits – Worksheet 3

1. Sketch a graph of the function f(x) $f(x) = \begin{cases} \frac{1}{x^2}, & x < -1 \\ 2, & -1 \le x < 1 \\ 3, & x = 1 \\ x+1, & 1 < x \le 2 \\ \frac{-1}{(x-2)^2}, & x > 2 \end{cases}$

2. Using your graph from problem 1, determine the value of each of the following limits:

a. $\lim_{x \to -1^-} f(x) =$ b. $\lim_{x \to -1^+} f(x) =$ c. $\lim_{x \to -1} f(x) =$

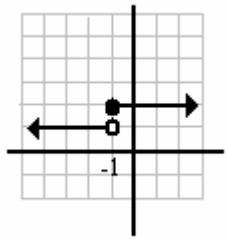
d. $\lim_{x \to 1^-} f(x) =$ e. $\lim_{x \to 1^+} f(x) =$ f. $\lim_{x \to 1} f(x) =$

g. $\lim_{x \to 2^-} f(x) =$ h. $\lim_{x \to 2^+} f(x) =$ i. $\lim_{x \to 2} f(x) =$

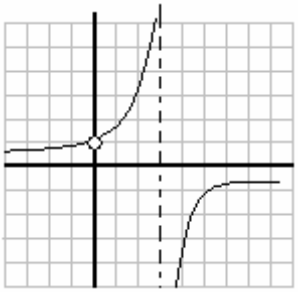
j. $\lim_{x \to -3} f(x) =$ k. $\lim_{x \to 5} f(x) =$ l. $\lim_{x \to 1.5} f(x) =$

For problems 3–8, use the graph to test each function for continuity at the indicated value of x.

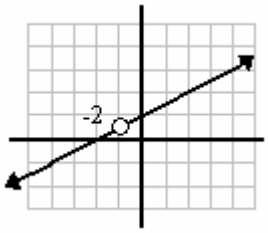
3. x = –1



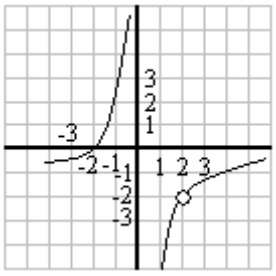
4. x = 3



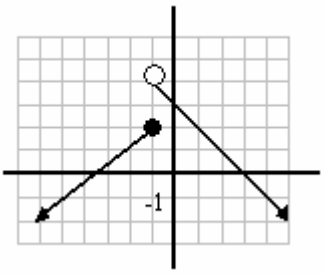
5. x = –2



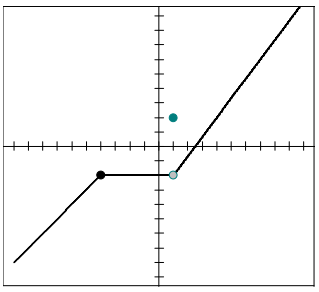
6. x = 2



7. x = –1



8. x = 1



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Use the graphs of 3–8 to answer the following # 9 – 14:

9. Name the open interval(s) on which the function in problem 3 is continuous.
10. Name the type of discontinuity for problem 4.
11. How would you define $f(-1)$ to remove the discontinuity in problem 5?
12. Name the open interval(s) on which the function in problem 6 is continuous.
13. Is it possible to remove the discontinuity in problem 7?
14. Use the graph of problem 8 to define the piecewise function $h(x)$.

Find each one–sided limit:

15. $\lim_{x\to 2^+} \frac{x-3}{x-2} =$

16. $\lim_{x\to 0^-} \frac{|x|}{x} =$

17. $\lim_{x\to 3^+} \frac{x-5}{x^2-9} =$

18. $\lim_{x\to \pi^-} \frac{\cos x}{x} =$

19. $\lim_{x\to 3^-} \frac{x^2+2x-3}{x^2+x-6} =$