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

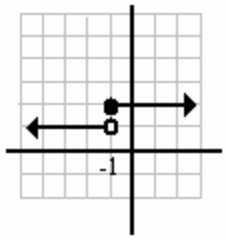
d. $\lim_{x \to 1^-} f(x)$ e. $\lim_{x \to 1^+} f(x)$ f. $\lim_{x \to 1} f(x)$

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

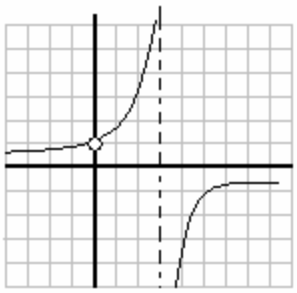
j. $\lim_{x \to -3} f(x)$ k. $\lim_{x \to 5} f(x)$ l. $\lim_{x \to 1.5} f(x)$

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

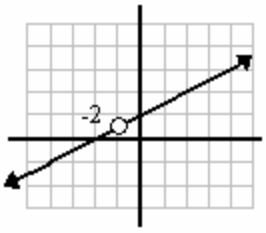
3. x = -1



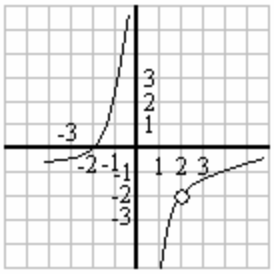
4. x = 3



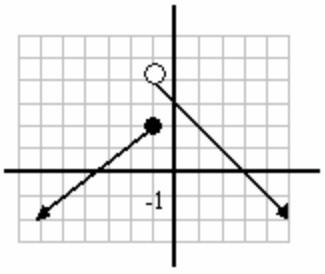
5. x = -2



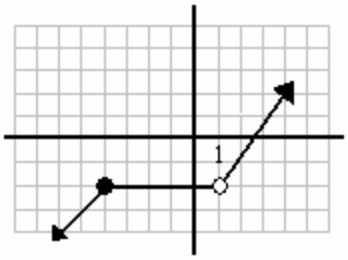
6. x = 2



7. x = -1



8. x = 1



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 <u>continuous</u>.

10. Name the type of discontinuity for problem 4.

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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 <u>continuous</u>.

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

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

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

18. $\lim_{s\to p^-} \frac{\cos x}{x}$

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