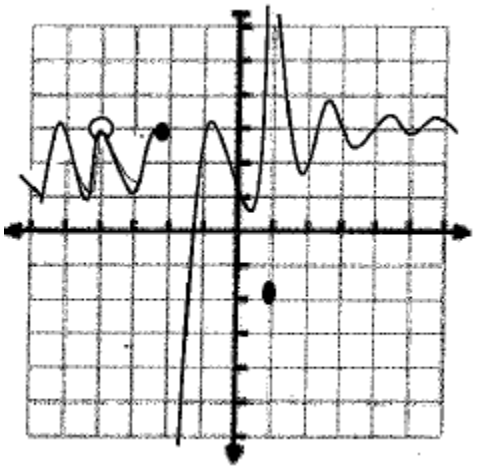
Final Exam Review – Limits

Limits from Graphs

Using the graph $g(x)$ below, find the indicated limits.



a. $\lim_{x\to-\infty} g(x)$ b. $\lim_{x\to-2^-} g(x)$ c. $\lim_{x\to-2^+} g(x)$ d. $\lim_{x\to-2} g(x)$

e. $\lim_{x\to-4} g(x)$ f. $\lim_{x\to1} g(x)$ g. $\lim_{x\to\infty} g(x)$ h. $g(1)$

Limits from Tables

From this table of values, evaluate the following limits.

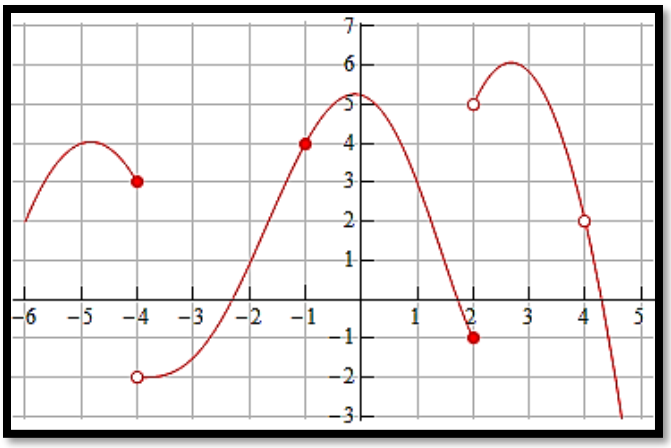
x	-0.3	-0.2	-0.1	0	0.1	0.2	0.3
$f(x)$	1235	3025	44235	Undefined	6.004	6.006	6.012
$g(x)$	4.532	4.213	4.013	8	8.0015	8.1016	8.546
$h(x)$	6.275	6.191	6.013	12	5.997	5.987	5.971

$\lim_{x\to0^+} f(x)$	$\lim_{x\to0^-} f(x)$	$\lim_{x\to0} f(x)$
$\lim_{x\to0^+} g(x)$	$\lim_{x\to0^-} g(x)$	$\lim_{x\to0} g(x)$
$\lim_{x\to0^+} h(x)$	$\lim_{x\to0^-} h(x)$	$\lim_{x\to0} h(x)$

Discontinuities

Describe the type(s) of discontinuities.

a. $f(x) = \begin{cases} x-3, & x \le 2 \\ 2x+1, & x > 2 \end{cases}$ b. $f(x) = \frac{|x+4|}{x+4}$ c. $f(x) = \frac{15x}{x^2+5x}$



a. Is $\lim_{x\to -4^+} f(x) = f(-4)$?

b. Is $\lim_{x\to 4^-} f(x) = \lim_{x\to 4^+} f(x)$?

c. Is $\lim_{x\to 4} f(x) = f(4)$?

More Limit Problems

1. $\lim_{x\to -5^-} \frac{4x+20}{|x+5|}$

2. Let $f(x)$ be a continuous function. If $f(x) = \frac{(2x-x^2)}{x^2+x-6}$ when $x^2 - 5x + 6 \neq 0$, what is $f(2)$?

3. Let f be the function defined below, where c is a constant. For what value of c, if any, is f continuous at $x = 2$?

$$f(x) = \begin{cases} 6 + cx, & x < 2 \\ -4 + 2\ln\left(\frac{x}{2}\right), & x \geq 2 \end{cases}$$

4. Let f be the function defined below, where c is a constant. For what value of c, if any, is f continuous at $x = 2$?

$$f(x) = \begin{cases} x^2 \cos\left(\frac{\pi}{2}x\right), & x < 2 \\ x^2 + cx - 16, & x \geq 2 \end{cases}$$

5. Let f be the function given by $f(x) = \frac{(x+5)^2(x+1)}{(x+5)(x-3)}$. For which of the values of x is f not continuous?

6. $\lim_{x\to 4} \frac{x-\sqrt{x+12}}{x-4}$

7. $\lim_{x\to 0} \frac{\left(\frac{2}{x+3}-\frac{2}{3}\right)}{x}$

8. $\lim_{x\to 2} \frac{3x^2+5x-2}{x^2-4}$

9. $\lim_{x\to\infty} \tan^{-1} x$

10. $\lim_{x\to-\infty} e^{-x}$

11. $\lim_{x\to\infty} e^{-x}$

12. $\lim_{x\to 6^-} \sqrt{x-6}$

13. $\lim_{x\to 0^+} \ln x$

14. $\lim_{x\to 0^-} \ln x$

15. $\lim_{x\to\infty} \ln x$

16. $\lim_{x\to-\infty} \sin x$

17. $\lim_{x\to\infty} \frac{-4x+2x^3}{8x^3+4x^2-3}$

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

19. $\lim_{x\to-\infty} \frac{\sqrt{4x^2-3x+5}}{7x+4}$

20. $\lim_{x\to2^-} -\frac{5}{x-2}$

21. $\lim_{x\to0^-} -\frac{3}{x^3}$

22. A function $f(x)$ has a vertical asymptote at $x = 3$. Which of the following statements could be used to justify this vertical asymptote?
    a. $\lim_{x\to0} f(x) = 3$
    b. $\lim_{x\to3} f(x) = 0$
    c. $\lim_{x\to3^+} f(x) = \infty$
    d. $\lim_{x\to3^-} f(x) = 0$
    e. $\lim_{x\to\infty} f(x) = -5$

23. If $y = 5$ is a horizontal asymptote of a rational function f, then which of the following must be true?
    a. $\lim_{x\to5^+} f(x) = \infty$
    b. $\lim_{x\to\infty} f(x) = 5$
    c. $\lim_{x\to0} f(x) = 5$
    d. $\lim_{x\to5} f(x) = 0$
    e. $\lim_{x\to-\infty} f(x) = -5$

24. The graph of which function has $y = 2$ as an asymptote?
    a. $y = e^{-x} + 2$
    b. $y = \ln(x - 2)$
    c. $y = -\frac{2x^2}{4+x^2}$
    d. $y = -\frac{2}{1-x}$
    e. $y = \frac{4x}{2+x}$