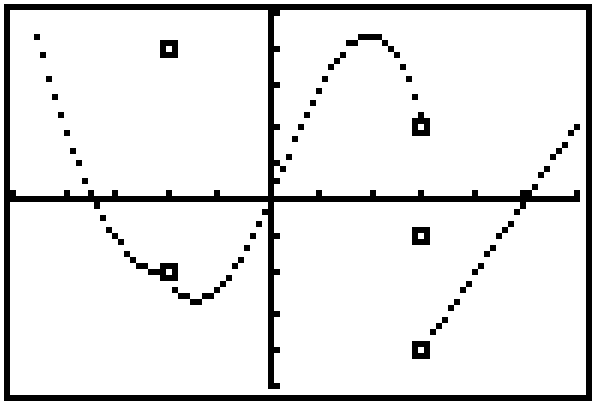
Calculus 118 Test 3 Fall, 2001



$1-12$ Use the graph of $f(x)$, above, to answer the questions.

1) $\lim_{x\to 3^+} f(x) =$

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

3) $\lim_{x\to 3} f(x) =$

4) $f(3) =$

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

6) $\lim_{x\to -2^-} f(x) =$

7) $\lim_{x\to -2} f(x) =$

8) $f(-2) =$

Circle True or False

True False 9) $f(x)$ is continuous at $x = -2$.

True False 10) $f(x)$ is continuous at $x = 0$.

True False 11) $f(x)$ is continuous at $x = 3$.

True False 12) $f(x)$ is continuous at $x = 5$.

$13-22$ Evaluate the following limits. **Show all work** (expanding, factoring, rationalizing).

13) $\lim_{x\to 1} (x^{17} - x + 1) =$

14) $\lim_{x\to 3} \frac{x^2-9}{x^2-4x+3} =$

15) $\lim_{x\to 2^+} \frac{|x-2|}{x-2}$

16) $\lim_{x\to 1} \frac{x-1}{\sqrt{x}-1}$

17) $\lim_{x\to 1} \frac{x-1}{x^3-1}$

18) $\lim_{x\to 1} f(x)$ where $f(x) = \begin{cases} x+2 & \text{if } x \leq -1 \\ x^2 & \text{if } -1 < x < 1 \\ 3-x & \text{if } x \geq 1 \end{cases}$

19) $\lim_{x\to\infty} \frac{x^2-1}{x^2+2x-1}$

20) $\lim_{x\to\infty} \frac{3x-1}{\sqrt{x^2+2x}}$

21) $\lim_{x\to\infty} \sqrt{4x^2+x} - 2x$

22) $\lim_{x\to\infty} \frac{x^3-1}{34x^2+2x-1}$

23) Find the constant(s) c that make(s) the function $f(x) = \begin{cases} c^2 - x^2 & \text{if } x < 2 \\ 2(c-x) & \text{if } x \geq 2 \end{cases}$

$24-28$ In each of the following, circle **all** that apply to the function.

24) $f(x) = \frac{x^2-1}{x^3-1}$

$a)$ f is everywhere continuous
$b)$ f has a removable discontinuity at $x = 1$
$c)$ f has a vertical asymptote at $x = 1$
$d)$ f has a removable discontinuity at $x = -1$
$e)$ f has a vertical asymptote at $x = -1$
$f)$ f has a horizontal asymptote at $y = 1$
$g)$ f has a horizontal asymptote at $y = -1$
$h)$ f has a horizontal asymptote at $y = 0$

25) $g(x) = \frac{x^3-1}{x^2-1}$

$a)$ g is everywhere continuous
$b)$ g has a removable discontinuity at $x = 1$
$c)$ g has a vertical asymptote at $x = 1$
$d)$ g has a removable discontinuity at $x = -1$
$e)$ g has a vertical asymptote at $x = -1$
$f)$ g has a horizontal asymptote at $y = 1$
$g)$ g has a horizontal asymptote at $y = -1$
$h)$ f has a horizontal asymptote at $y = 0$

26) $h(x) = \begin{cases} e^{x+1} & \text{if } x < -1 \\ x^2 + 2x + 2 & \text{if } -1 \leq x < 1 \\ \frac{5}{x+2} & \text{if } x > 1 \end{cases}$

$a)$ h is everywhere continuous
$b)$ h is not defined at $x = 1$
$c)$ h is not defined at $x = -1$
$d)$ There is no limit at $x = 1$
$e)$ There is no limit at $x = -1$
$f)$ h is discontinuous at $x = 1$
$g)$ h is discontinuous at $x = -1$

27) $j(x) = \begin{cases} x^4 + 3 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 3 - \sqrt{x} & \text{if } x > 0 \end{cases}$

$a)$ j is everywhere continuous
$b)$ j is not defined at $x = 0$
$c)$ j has no limit at $x = 0$
$d)$ j is discontinuous at $x = 0$

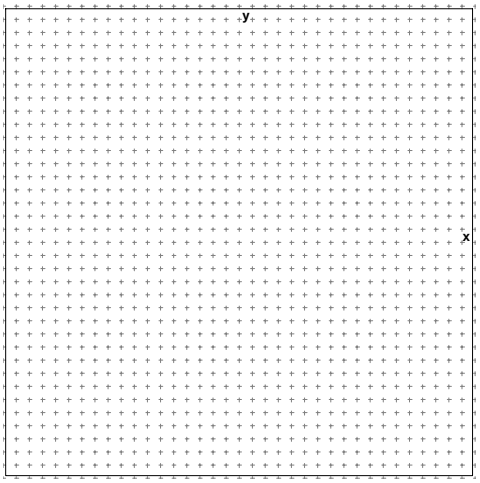
28) $k(x) = \frac{3x}{\sqrt{x^2+1}}$

$a)$ k is everywhere continuous
$b)$ k has a vertical asymptote at $x = -1$
$c)$ k has a vertical asymptote at $x = 0$
$d)$ k has a horizontal asymptote at $y = 3$
$e)$ k has a horizontal asymptote at $y = 0$

29) Given the following information about limits, sketch a graph which could be the graph of $y = f(x)$.

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

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


y
x