

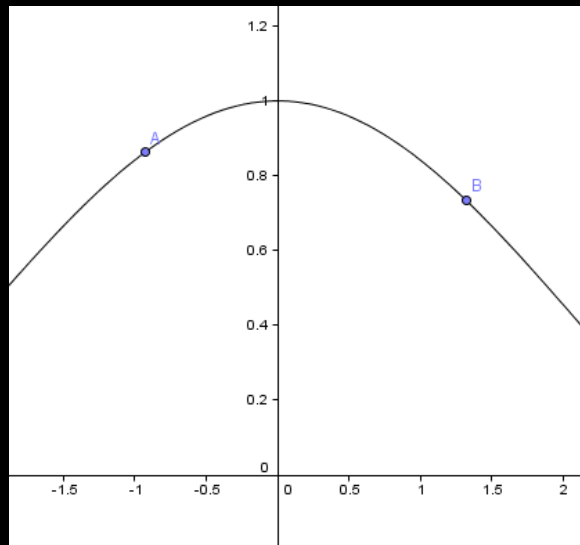
AP Calculus AB
Thursday, September 12, 2013

Please do page 5: 7-15 in the packet. You will need a graphing utility.

$$\begin{aligned} \textcircled{\Rightarrow} \lim_{x \rightarrow 0^-} \frac{1 - \cos x}{x} &= 0 \\ \lim_{x \rightarrow 0^+} \frac{1 - \cos x}{x} &= 0 \end{aligned} \left. \vphantom{\begin{aligned} \lim_{x \rightarrow 0^-} \frac{1 - \cos x}{x} \\ \lim_{x \rightarrow 0^+} \frac{1 - \cos x}{x} \end{aligned}} \right\} \begin{array}{l} \text{Memorize!} \\ \lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = 0 \end{array}$$

$$10. \lim_{x \rightarrow 0} \frac{\sin x}{x}$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$



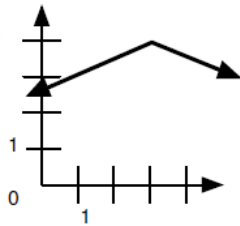
$\lim_{x \rightarrow 0} \cos\left(\frac{1}{x}\right)$ dne because $\cos\frac{1}{x}$ oscillates as $x \rightarrow 0$.

10. $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

14. $\lim_{x \rightarrow 0} \left[\cos\left(\frac{1}{x}\right) \right]$

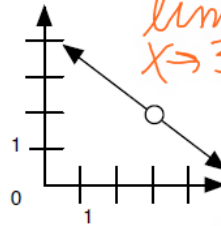
15. In the exercises below, the graph of a function is given. State whether or not the $\lim_{x \rightarrow 3} f(x)$ exists and, if it does, give its value.

$\lim_{x \rightarrow 3} f(x) = 4$
 $f(3) = 4$

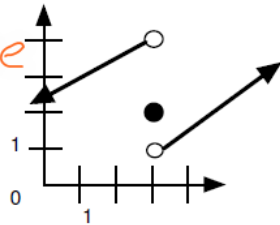


b.

$\lim_{x \rightarrow 3} f(x) = 2$
 $f(3)$ dne

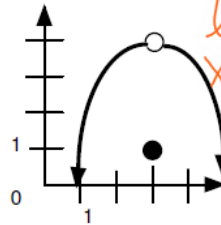


$\lim_{x \rightarrow 3} f(x)$ dne
 $f(3) = 2$



d.

$\lim_{x \rightarrow 3} f(x) = 4$
 $f(3) = 1$



16. Find the following one-sided limits (if they exist):

a. $\lim_{x \rightarrow 5^+} \frac{x-5}{x^2-25}$

b. $\lim_{x \rightarrow 2^+} \frac{2-x}{x^2-4}$

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The graph of the function f is shown in the figure above. Which of the following statements about f is true?

If

$\lim_{x \rightarrow a} f(x) = \lim_{x \rightarrow b} f(x)$ No bc $\lim_{x \rightarrow b} f(x)$ dne

$\lim_{x \rightarrow a} f(x) = 2$

$\lim_{x \rightarrow b} f(x) = 2$

$\lim_{x \rightarrow b} f(x) = 1$

$\lim_{x \rightarrow a} f(x)$ does not exist.

17. For the function f graphed below, find the indicated limit or function value, or state that the limit does not exist.

a. $\lim_{x \rightarrow -3} f(x) = 5$

b. $f(-3) = 2$

c. $\lim_{x \rightarrow -1} f(x) = 6$

d. $f(-1)$ dne

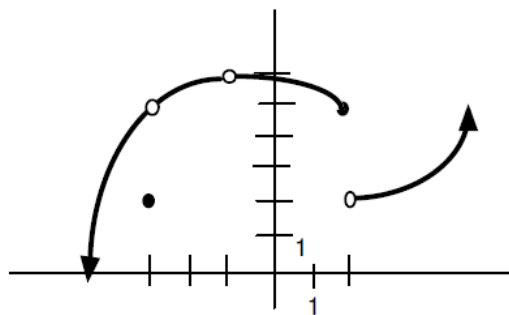
e. $f(1) = 5.5$

f. $\lim_{x \rightarrow 2^-} f(x) = 5$

g. $\lim_{x \rightarrow 2^+} f(x) = 2$

h. $\lim_{x \rightarrow 2} f(x)$ dne

i. $f(2) = 5$



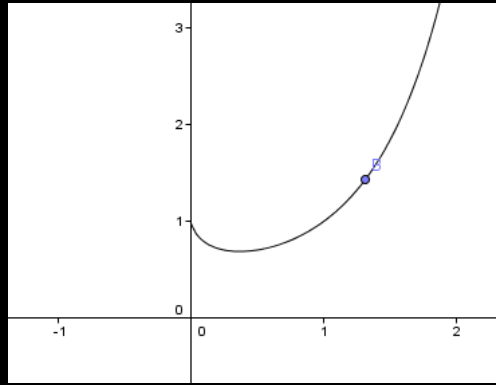
18. Sketch the graph of the piecewise function below and then find each of the following limits or function values. If the limit does not exist, write "DNE"; if the value is not defined write "undefined".

$$g(x) = \begin{cases} -x+1 & \text{if } x < 1 \\ x-1 & \text{if } 1 \leq x < 2 \end{cases}$$

a. $\lim_{x \rightarrow 1} g(x)$

b. $g(1)$

$$f. \lim_{x \rightarrow 0^+} x^x$$



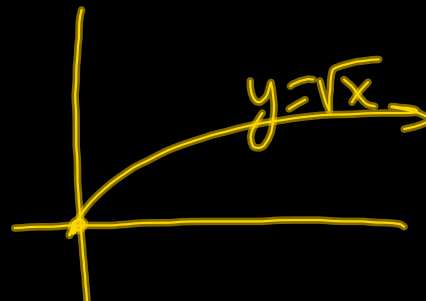
$$\lim_{x \rightarrow 0^+} x^x = 1$$

$$y = x^x$$
$$(-2)^{-2}$$

$$\frac{1}{(-2)^2}$$
$$\frac{1}{4}$$

$$\left(-\frac{1}{2}\right)^{-1/2} = \frac{1}{\sqrt{-\frac{1}{2}}}$$

$$\lim_{x \rightarrow 0} \sqrt{x}$$



$$\text{Domain: } x \geq 0$$

This limit cannot be evaluated because the function is not defined when $x < 0$.