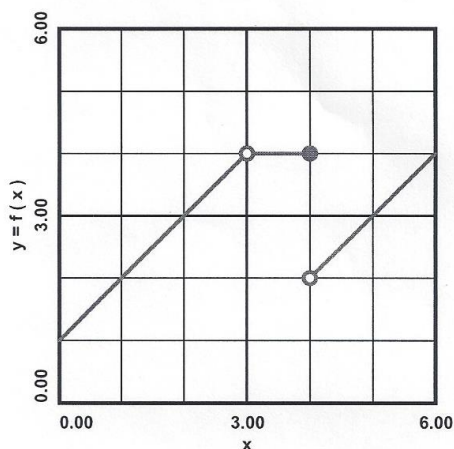


# AP CALCULUS AB

1) For  $y = f(x)$  shown,



calculate  $\lim_{x \rightarrow a^-} f(x)$ ,  $\lim_{x \rightarrow a^+} f(x)$  and  $\lim_{x \rightarrow a} f(x)$  for

a)  $a = 3$       b)  $a = 4$

$$(a) \lim_{x \rightarrow 3^-} f(x) = 4, \lim_{x \rightarrow 3^+} f(x) = 4$$

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

$$(b) \lim_{x \rightarrow 4^-} f(x) = 4, \lim_{x \rightarrow 4^+} f(x) = 2$$

$$\Rightarrow \lim_{x \rightarrow 4} f(x) \text{ D.N.E.}$$

2) Calculate  $\lim_{x \rightarrow 3} f(x)$  for

a)

$$f(x) = \frac{1}{|x-3|} \rightarrow$$

b)

$$f(x) = \frac{1}{x-3} \rightarrow$$

$$(a) \lim_{x \rightarrow 3^-} f(x) = \lim_{x \rightarrow 3^+} f(x) = \lim_{x \rightarrow 3} f(x) = \infty$$

$$(b) \lim_{x \rightarrow 3^-} f(x) = -\infty, \lim_{x \rightarrow 3^+} f(x) = \infty \Rightarrow$$

$$\lim_{x \rightarrow 3} f(x) \text{ D.N.E.}$$

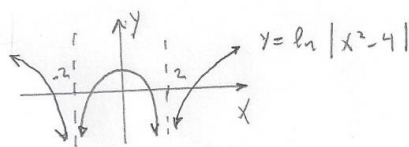
# DEFINITION OF LIMITS

3) Calculate

- a)  $\lim_{x \rightarrow 0} x \cdot \sin x$
- b)  $\lim_{x \rightarrow 0} x \cdot \sin\left(\frac{1}{x}\right)$
- c)  $\lim_{x \rightarrow -2} \ln|x^2 - 4|$
- d)  $\lim_{x \rightarrow 2} \ln|x^2 - 4|$

$$(a) \lim_{x \rightarrow 0} x \cdot \sin x = 0 \cdot \sin 0 = 0 \cdot 0 = 0$$

$$(b) \lim_{x \rightarrow 0} x \cdot \sin\left(\frac{1}{x}\right) = 0 \cdot \left[ \begin{array}{c} \text{bounded} \\ \text{between} \\ -1 \text{ \& } 1 \end{array} \right] = 0$$



$$(c) \lim_{x \rightarrow -2} \ln|x^2 - 4| = -\infty$$

$$(d) \lim_{x \rightarrow 2} \ln|x^2 - 4| = -\infty$$