AP Calculus AB
Friday, August 30, 2013

Bellwork....Draw/sketch the graph of a function with the following attributes:

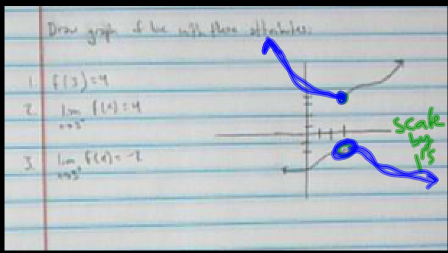
① $f(3) = 4$

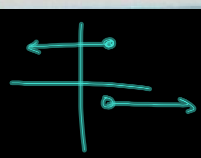
② $\lim_{x \to 3^-} f(x) = 4$

③ $\lim_{x \to 3^+} f(x) = -2$

More with limits!

PSAT juniors....





Does the value of the function at x=a have any relationship to the limit of the function at x=a?

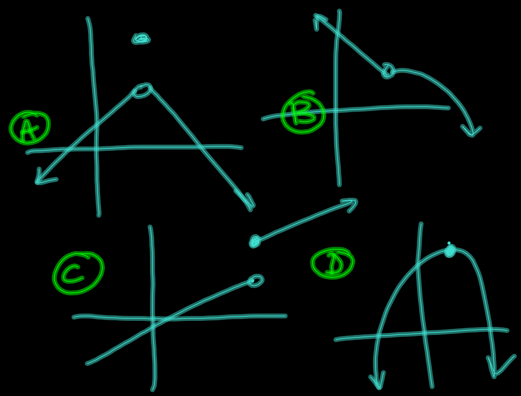
Does the limit of the function at x=a have any relationship to the value of the function at x=a?

Be prepared to give graphical support for your answer.

If I tell you that f(a) = 3, what does that tell you about the limit at x=a?

If tell you that the limit at x=b is -4, what does that tell you about f(-4)?

A limit is the INTENDED HEIGHT of a function. The value of the limit at any given x does not have to be the same as the value of the function at that x and vice versa.



Continuity @ $x = c$

① $\lim_{x \to c} f(x)$ exists

② $f(c)$ exists

③ $\lim_{x \to c} f(x) = f(c)$

03 graphical approach to limits.pdf - Adobe Reader

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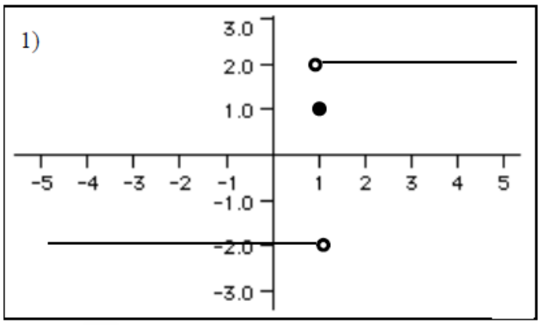
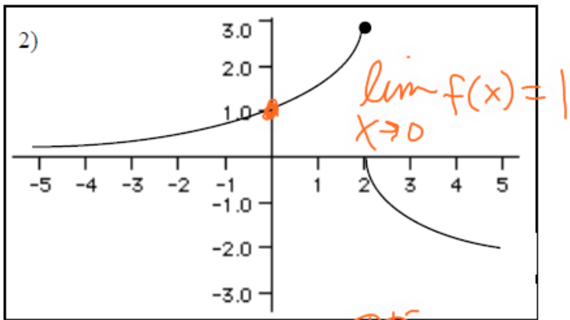
Graphical Approach to Limits - Homework



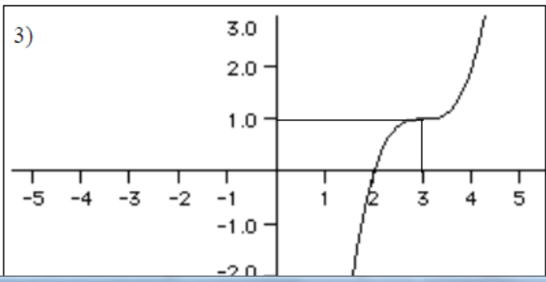


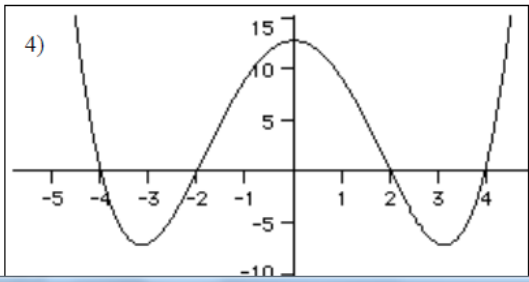
a) $\lim_{x \to 1^-} f(x)$ -2 b) $\lim_{x \to 1^+} f(x) = 2$ c) $\lim_{x \to 1} f(x)$ dne

d) $f(1) = 1$ e) $\lim_{x \to -\infty} f(x) = -2$ f) $\lim_{x \to \infty} f(x) = 2$

a) $\lim_{x \to 2^-} f(x) = 3$ b) $\lim_{x \to 2^+} f(x) = 0$ c) $\lim_{x \to 2} f(x)$ DNE dne

d) $f(2) = 3$ e) $\lim_{x \to -\infty} f(x)$ f) $\lim_{x \to \infty} f(x)$





Finding Limits Algebraically - Classwork

We are going to now determine limits without benefit of looking at a graph, that is $\lim\limits_{x \to a} f(x)$.

There are three steps to remember:
1) plug in a
2) Factor/cancel and go back to step 1
3) ∞, $-\infty$, or DNE

Example 1) find $\lim\limits_{x \to -2} x^2 - 4x + 1$

You can do this by plugging in.

$$\lim_{x \to -2} x^2 - 4x + 1 = (-2)^2 - 4(-2) + 1 = 13$$

Example 2) find $\lim\limits_{x \to -2} \dfrac{2x-6}{x-2}$

You can also do this by plugging in.

$$= \frac{2(-2)-6}{-2-2} = \frac{-4-6}{-4} = \frac{5}{2}$$

Example 3) find $\lim\limits_{x \to -2} \dfrac{x^2 - 2x - 8}{x^2 - 4}$

Plug in and you get $\frac{0}{0}$ - no good

So attempt to factor and cancel

$$= \frac{(-2)^2 - 2(-2) - 8}{(-2)^2 - 4} = \frac{0}{0} \quad \text{X}$$

$$\lim_{x \to -2} \frac{(x-4)(x+2)}{(x-2)(x+2)}$$

$$\lim_{x \to -2} \frac{x-4}{x-2} = \frac{-6}{-4} = \frac{3}{2}$$

Example 4) find $\lim\limits_{x \to 1} \dfrac{x^2 - 2x + 1}{x^3 - 1}$

Plug in and you get $\frac{0}{0}$ - no good

So attempt to factor and cancel

Example 11) $\lim_{x\to 0}\frac{\sqrt{x+2}-\sqrt{2}}{x} = \frac{\sqrt{0+2}-\sqrt{2}}{0} = \frac{0}{0}$

multiply by conjugate

$$\frac{1}{3-\sqrt{2}}\cdot\frac{3+\sqrt{2}}{3+\sqrt{2}}$$

$$\lim_{x\to 0}\left(\frac{\sqrt{x+2}-\sqrt{2}}{x}\right)\cdot\left(\frac{\sqrt{x+2}+\sqrt{2}}{\sqrt{x+2}+\sqrt{2}}\right)$$

$$\lim_{x\to 0}\frac{x+\cancel{2}-\cancel{2}}{x(\sqrt{x+2}+\sqrt{2})}$$

$$\lim_{x\to 0}\frac{\cancel{x}}{\cancel{x}(\sqrt{x+2}+\sqrt{2})}$$

$$\lim_{x\to 0}\frac{1}{\sqrt{\cancel{x}+2}+\sqrt{2}} = \frac{1}{2\sqrt{2}}$$

HW GRAPHICAL
MMM03-hw

LimitsAlgebraically
MMM04: HW (39 prbs)