

Bellwork:

Test tomorrow..
 you can start as
 early as 7:15am

1. Sketch the graph of a function with the following attributes:

$$f(3) = 4, \quad \lim_{x \rightarrow 3^-} f(x) = -2, \quad \lim_{x \rightarrow 3^+} f(x) = 6.$$

limit as x approaches three from the left is -2.

limit as x approaches three from the right is 6.

2. Find the equation of a rational function that has a limit of -2 as x approaches positive infinity.

③ Evaluate $\lim_{x \rightarrow a} \frac{x^2 - a^2}{x^4 - a^4}$



② $f(x) = -\frac{2}{x}$

$$h(x) = \frac{1000^{51} - 2x^9}{x + 3x^3 - 15x^5 + x^9}$$

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

$$\textcircled{3} \quad \lim_{x \rightarrow a} \frac{x^2 - a^2}{x^4 - a^4} = \frac{a^2 - a^2}{a^4 - a^4} = \frac{0}{0}$$

$$\lim_{x \rightarrow a} \frac{\cancel{x^2 - a^2}}{(\cancel{x^2 - a^2})(x^2 + a^2)}$$

$$\lim_{x \rightarrow a} \frac{1}{x^2 + a^2} = \frac{1}{a^2 + a^2} = \left(\frac{1}{2a^2} \right)$$

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6. (4 points) Let $f(x) = x^2 + 2x$. What is the average rate of change of $f(x)$ on the interval $[1,3]$?

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

$$= \frac{3^2 + 2 \cdot 3 - (1^2 + 2 \cdot 1)}{2}$$

$$= \frac{15 - 3}{2}$$

$$= 6$$

→ also slope of secant line

7. (2 points) If the limit as x approaches 2 is 4, what does that tell you about $f(2)$? Explain.

eqn of tangent line

$$f(x) = x^3 - x^2 + 1 \quad @ \quad x = -1$$

$$m_{tan} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$m_{tan} = \lim_{h \rightarrow 0} \frac{f(-1+h) - f(-1)}{h}$$

$$m_{tan} = \lim_{h \rightarrow 0} \frac{(h-1)^3 - (h-1)^2 + 1 - ((-1)^3 - (-1)^2 + 1)}{h}$$

$$m_{tan} = \lim_{h \rightarrow 0} \frac{h^3 - 3h^2 + 3h - 1 - (h^2 - 2h + 1) + 1 - (-1 - 1 + 1)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{h^3 - 4h^2 + 5h}{h}$$

$$= \lim_{h \rightarrow 0} h^2 - 4h + 5$$

$$m_{tan} = 5$$