Bell Work:
What do we need to talk about?

■ Quiz Today:

Evaluate Limit

Find Derivative (both ways)

Write equation of a line tangent to a given point

PRE-CALC TRIG

Day 74

Evaluate the limit.

1.) $\lim\limits_{x \to -2} 8x + 10$

2.) $\lim\limits_{x \to 6} \dfrac{(x+2)(x-6)}{(x-6)}$

Find the derivative.

$f(x) = -6x^2 + 4x + 8$

3.) $\lim\limits_{h \to 0}$ _____

4.) $f'(x) =$ _____

5.) *Write the equation of the line tangent to f(x) at (1,6).*

$f(x) = -6x^2 + 4x + 8$

From Last Time

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12.4 Limits at Infinity

Remember:
 If $f(x)$ becomes arbitrarily
close to a unique number L
as x $approaches\ c\ from\ either\ side,$
$the\ limit\ of\ f(x)$ as x approaches c is L.

$$\lim_{x \to c} f(x) = L$$

Definition of Limits at Infinity

$$\lim_{x \to -\infty} f(x) = L_1$$

$$\lim_{x \to \infty} f(x) = L_2$$

Limits at Infinity

If r is a positive real number, then

$$\lim_{x \to \infty} \frac{1}{x^r} = 0 \qquad \text{[limit toward the right]}$$

Also, if x^r is defined when x < 0, then

$$\lim_{x \to -\infty} \frac{1}{x^r} = 0 \qquad \text{[limit toward the left]}$$

Example: Find the limit

$$\lim_{x \to \infty} \left(8 - \frac{5}{x^2}\right)$$

Example

Find the limit

$$\lim_{x \to \infty} (8 - \frac{5}{x^2}) \ \to \ \lim_{x \to \infty} 8 - \left(\lim_{x \to \infty} \frac{5}{x^2} \right) \to \ \lim_{x \to \infty} 8 - 5(\lim_{x \to \infty} \frac{1}{x^2})$$

$$8 - 5(0)$$

$$\lim_{x \to \infty} (8 - \frac{5}{x^2}) = \mathbf{8}$$

Example: Find the limit

[Hint: Divide everything by the highest powered term in denominator]

$$\lim_{x\to\infty}\left(\frac{-2x+3}{3x^2+1}\right)$$

$$\lim_{x\to\infty}\left(\frac{-2x^2+3}{3x^2+1}\right)$$

$$\lim_{x\to\infty}\left(\frac{-2x^3+3}{3x^2+1}\right)$$

$$\lim_{x \to \infty} \left(\frac{-2x+3}{3x^2+1} \right)$$

$$\lim_{x \to \infty} \left(\frac{-2x^2+3}{3x^2+1} \right)$$

$$\lim_{x \to \infty} \left(\frac{-2x^3+3}{3x^2+1} \right)$$

$$\lim_{x \to \infty} \left(\frac{-\frac{2}{x}+\frac{3}{x^2}}{3+\frac{1}{x^2}} \right)$$

$$\lim_{x \to \infty} \left(\frac{-2+\frac{3}{x^2}}{3+\frac{1}{x^2}} \right)$$

$$\lim_{x \to \infty} \left(\frac{-2x+\frac{3}{x^2}}{3+\frac{1}{x^2}} \right)$$

$$\frac{-0+0}{3+0}$$

$$\frac{-2+0}{3+0}$$

$$\frac{-2x}{3}$$

0

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

Limit does not exist

The numerator has no bound as denominator becomes 3

For Next Time

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