DO NOW

Get a laptop and get logged on.

3.1 Derivatives Introduction - Day 3

Finding the equation of the tangent line at a given point:

- Find $f'(x)$
- Find slope at that point
- Use $y-y_1=m(x-x_1)$

Example: $f(x) = x^2 - 3$

Find the equation of the tangent line at the point (2, 1)

$$\lim_{\Delta x\to 0}\frac{f(x+\Delta x)-f(x)}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{(x+\Delta x)^2-3-(x^2-3)}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{x^2+2x\Delta x+(\Delta x)^2-3-x^2+3}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{2x\Delta x+(\Delta x)^2}{\Delta x}$$
$$\lim_{\Delta x\to 0}2x+\Delta x$$

$f'(x)=2x$

$f'(2)=2(2)$

$m=4$

equation:

$y-y_1=m(x-x_1)$

$y-1=4(x-2)$

$y-1=4x-8$

$0=4x-y-7$

Example: $f(x) = 2x^2 - 5$

Find the equation of the tangent line at the point (2, 3)

$$\lim_{\Delta x\to 0}\frac{f(x+\Delta x)-f(x)}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{2(x+\Delta x)^2-5-(2x^2-5)}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{2(x^2+2x\Delta x+(\Delta x)^2-5-2x^2+5}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{2x^2+4x\Delta x+2(\Delta x)^2-5-2x^2+5}{\Delta x}$$
$$\lim_{\Delta x\to 0}\frac{4x\Delta x+2(\Delta x)^2}{\Delta x}$$
$$\lim_{\Delta x\to 0}4x+2\Delta x$$

$f'(x)=4x$

$f'(2)=4(2)=8$

equation

$y-y_1=m(x-x_1)$

$y-3=8(x-2)$

$y-3=8x-16$

$0=8x-y-13$

Identify the derivative graphs

Draw the derivative graph

HOMEWORK

pg 124; 23 - 32