Calculus II Steve

Roy, Gabby, Kristin, Matthew

Calculus - Algebra & Trig with Limits.

$f(x) = 3x^2 - 4\sqrt[3]{x^2} - \frac{2}{x^3} - 5\cot x$

$= 3x^2 - 4x^{\frac{2}{3}} - 2x^{-3} - 5\cot x$

$\Rightarrow f'(x) = 6x - \frac{8}{3}x^{-\frac{1}{3}} + 6x^{-4} + 5\csc^2 x$

Stewart "Calculus" 6E.

7.1 #s 9, 12, 14, 15, 17, 18, 24, 27, 30, 32, 33, 36, 37, 40, 42

$f(x) = 2x\cos(x)$

Tangent line @ $(\frac{\pi}{2}, 0) = (x_1, y_1)$

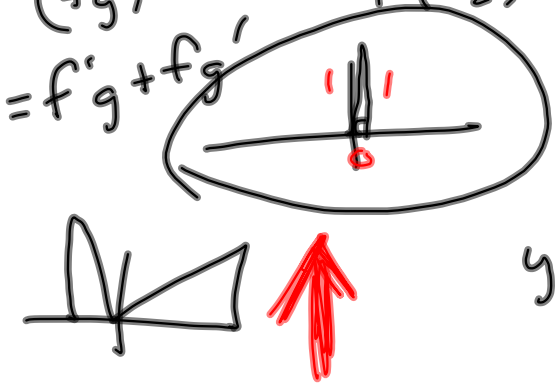
$f'(x) = 2\cos x - 2x\sin x \Rightarrow$

$f'(\frac{\pi}{2}) = 2\cos(\frac{\pi}{2}) - 2(\frac{\pi}{2})\sin(\frac{\pi}{2})$

$= 2 \cdot 0 - \pi \cdot 1$

$= -\pi = m_{tan}$

$(fg)' = f'g + fg'$



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

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

$y = -\pi(x - \frac{\pi}{2}) + 0$

Use the above to approximate

$f(\frac{2\pi}{3}) \approx -\pi(\frac{2\pi}{3} - \frac{\pi}{2})$

$= -\frac{2\pi^2}{3} + \frac{\pi^2}{2}$

$= \frac{-4\pi^2 + 3\pi^2}{6} = \frac{-\pi^2}{6}$

I can build a (Taylor) polynomial that's close to ANY differentiable function

Taylor Series

Close to the end.

Semester:

Exponential & Logarithmic Functions

$\frac{d}{dx}[e^{3x}] = 3e^{3x}$

$\frac{d}{dx}[e^{x}] = e^{x}$ is as steep as it is tall!

Logarithmic Functions – Bootstrap from exponentials with some inverse function know-how.

Inverse Trig Functions
Hyperbolic Trig functions & their inverses.

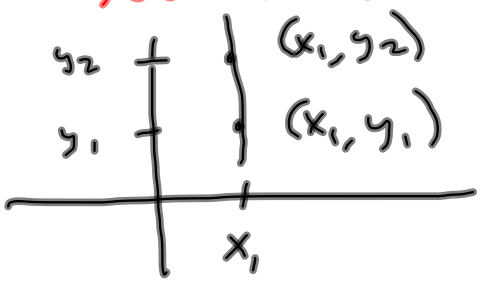
... Chapter 12

Chapters 7 – 12

Calc II is traditionally

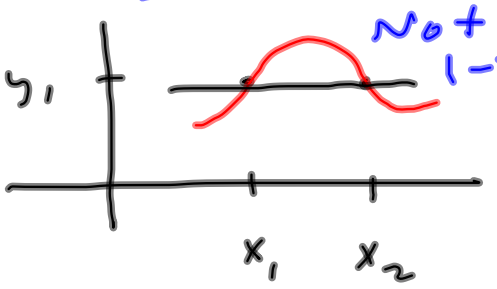
TECHNIQUES OF INTEGRATION.

Not Func.



2 y's for 1 x

Is Func. But Not 1-to-1.



2 x's for 1 y.

A function is 1-to-1 if

(i) $x_1 \neq x_2$ implies $f(x_1) \neq f(x_2)$

(ii) $f(x_1) = f(x_2)$ implies $x_1 = x_2$

Show that $f(x) = \frac{2x-3}{x+1}$ is 1-to-1, algebraically.

Suppose $f(x_1) = f(x_2)$ Then

$$\frac{2x_1-3}{x_1+1} = \frac{2x_2-3}{x_2+1}$$

Solve for x_1:

$$(2x_1-3)(x_2+1) = (2x_2-3)(x_1+1)$$

$$2x_1x_2 + 2x_1 - 3x_2 - 3 = 2x_1x_2 + 2x_2 - 3x_1 - 3$$

$$2x_1 - 3x_2 = 2x_2 - 3x_1$$

$$5x_1 = 5x_2$$

$$x_1 = x_2$$