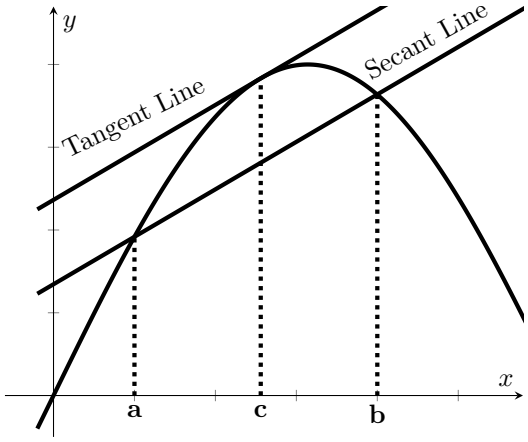
Math 132 - September 7, 2016

Warm-up Problems

1. $\boxed{\textbf{Clicker}}$ Explain the picture below and the Mean Value Theorem (MVT)



   (a) Given $f(x)$ and $a < b$, there is a c such that $f'(c) = \frac{f(b)-f(a)}{b-a}$
   (b) Given a function there is always a tangent line parallel to a secant line.
   (c) Given a tangent line, there is a parallel secant line
   (d) MVT? What are you talking about?

Class Problems

Fundamental Theorem of Calculus

I. $\dfrac{d}{dx}\displaystyle\int_a^x f(t)\,dt = f(x)$

II. $\displaystyle\int_a^b F'(x)\,dx = F(b) - F(a)$

2. $\boxed{\textbf{Clicker}}$ Find the derivative

$$\frac{d}{dx}\int_{-x^2}^{e^x} \sin(t^2)\,dt$$

   (a) $e^x \sin(e^{2x}) - 2x\sin(x^4)$
   (b) $e^x \sin(e^{2x}) + 2x\sin(x^4)$
   (c) $\sin(e^{2x}) - \sin(x^4)$
   (d) $e^x \sin(e^{2x})$
   (e) I have no idea

3. (True/False) Any derivative formula gives a corresponding indefinite integral formula?
   (a) True (b) False (c) Neither True or False

4. Perform the given u-substitution on the given integral. If possible, compute the indefinite integral.

(a) $\displaystyle\int x^2 \sin(x^3 + 3)\, dx$

$u = x^3$

$du =$

(b) $\displaystyle\int \sin(x^3 + 3)\, dx$

$u = x^3$

$du =$

(c) $\displaystyle\int \tan x\, dx$

$u = \tan x$

$du =$

(d) $\displaystyle\int \tan x\, dx$

$u = \cos x$

$du =$