

Math 1A

Quiz 5 - September 30, 2009

Name:

1. Find the derivative of the following functions:

$$(a) \frac{e^x}{(x+1)(x-2)} = \frac{e^x}{x^2-x-2}$$

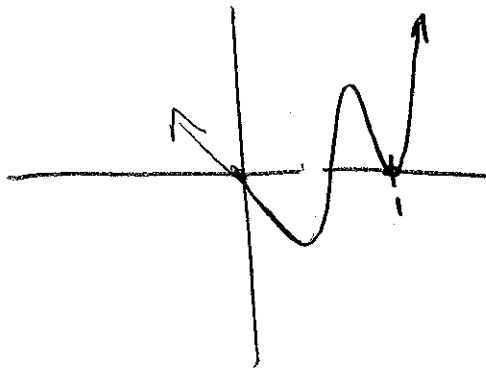
$$\frac{d}{dx} = \frac{e^x(x^2-x-2) - (2x-1)e^x}{(x^2-x-2)^2}$$

$$(b) (1 + \tan(e^x + 2x))^{10}$$

$$10(1 + \tan(e^x + 2x))^9 (\sec^2(e^x + 2x)) \cdot (e^x + 2)$$

2. Draw the graph of a curve which satisfies:

$$\begin{aligned} f(0) &= 0, \\ f(1) &= 0, \\ f'(0) &= -1, \\ f'(1) &= 0. \end{aligned}$$



3. Find the equation of a cubic polynomial (degree 3) which has a horizontal tangent line at the point (0,0) and a tangent line of slope 2 at the point (1,2). (Hint: Write $f(x) = ax^3 + bx^2 + cx + d$ and try to figure out what a, b, c, d are from the given information.) $f'(x) = 3ax^2 + 2bx + c$

Goes through 0,0 means $f(0)=0$ so $0 = a \cdot 0^3 + b \cdot 0^2 + c \cdot 0 + d = d \therefore d=0$
 Horizontal tangent at 0 means $f'(0)=0$ so $0 = 3a \cdot 0^2 + 2b \cdot 0 + c \therefore c=0$
 So $f(x) = ax^3 + bx^2$ we need to find a, b .

$$\begin{aligned} f(1) &= 2 \text{ means } \left. \begin{aligned} a(1)^3 + b(1)^2 &= 2 \\ 3a(1)^2 + 2b(1) &= 2 \end{aligned} \right\} \Rightarrow \left. \begin{aligned} a+b &= 2 \\ 3a+2b &= 2 \end{aligned} \right\} \end{aligned}$$

$a = 2 - b$. Substitute in 2nd eqn:

$$3(2-b) + 2b = 2 \Rightarrow 6 - 3b + 2b = 2 \Rightarrow b = 4, a = -2$$

$$f(x) = -2x^3 + 4x^2$$