MAC2311 Class Number 15534
QUIZ 6
2/21/2019

Name: SOLUTIONS

1. Compute the first and second derivatives for

$$f(x) = e^{\sin(x)}$$

1. $f'(x) = \left[\frac{d}{dx}(\sin(x))\right]\left[e^{\sin(x)}\right] = \cos(x)\,e^{\sin(x)} \Rightarrow \boxed{f'(x) = \cos(x)e^{\sin(x)}}$

2. $f''(x) = \left[-\sin(x)\right]\left[e^{\sin(x)}\right] + \left[\cos(x)\right]\left[\cos(x)\,e^{\sin(x)}\right] = \boxed{-\sin(x)e^{\sin(x)} + \cos^2(x)\,e^{\sin(x)}}$

($\frac{d}{dx}(\cos(x))$; $\frac{d}{dx}(e^{\sin(x)})$; $f''(x)$)

2. Calculate the derivative:

$$\frac{d}{dx}\left(\sqrt{3x}\right)$$

$$= \frac{d}{dx}\left((3x)^{1/2}\right)$$

$$= \frac{1}{2}(3x)^{\frac{1}{2}-1}\left[\frac{d}{dx}(3x)\right]$$

$$= \frac{1}{2}(3x)^{-1/2}[3] = \frac{1}{2\sqrt{3x}}(3) = \boxed{\frac{3}{2\sqrt{3x}}}$$

3. Implicity derive the expression $6x^2y^2 = -1$ and solve for $\frac{dy}{dx}$.

* PRODUCT RULE!

$$= [12x][y^2] + [6x^2]\left[2y\frac{dy}{dx}\right] = 0$$

(DERIVATIVE OF $6x^2$; DERIVATIVE OF y^2; DERIVATIVE OF -1)

$$\Rightarrow 12xy^2 + 12x^2y\frac{dy}{dx} = 0 \Rightarrow 12x^2y\frac{dy}{dx} = -12xy^2$$

$$\Rightarrow \frac{dy}{dx} = \frac{-12xy^2}{12x^2y} \Rightarrow \boxed{\frac{dy}{dx} = \frac{-y}{x}}$$