Math 121 S09N02 - Quiz 4
Feb 13 2009

Name:
Stu#: SOLUTIONS.

(1) [2 points] Differentiate

$$F(y) = \left(\frac{1}{y^2} - \frac{3}{y^4}\right)(y + 5y^3) = (y^{-2} - 3y^{-4})(y + 5y^3)$$

$$F'(y) = (-2y^{-3} + 12y^{-5})(y + 5y^3) + (y^{-2} - 3y^{-4})(1 + 15y^2)$$

(2) [3 points] Differentiate

$$f(\theta) = \frac{\sec(\theta)}{1 + \sec(\theta)}$$

$$f'(\theta) = \frac{[1+\sec(\theta)]\sec(\theta)\tan(\theta) - \sec(\theta)\sec(\theta)\tan(\theta)}{[1+\sec(\theta)]^2}$$

$$= \frac{\sec(\theta)\tan(\theta)}{[1+\sec(\theta)]^2}$$

(3) [2 points] Differentiate

$$y = (1 - x^2)^{10}$$

$$\frac{dy}{dx} = 10(1-x^2)^9 \cdot (-2x).$$

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(4) [3 points] Differentiate

$$y = \frac{r}{\sqrt{r^2+1}} = r\left[r^2+1\right]^{-\frac{1}{2}}$$

$$\frac{dy}{dr} = (1)\left[r^2+1\right]^{-\frac{1}{2}} + r\left(-\tfrac{1}{2}\right)\left[r^2+1\right]^{-\frac{3}{2}}(2r)$$

$$= \left[r^2+1\right]^{-\frac{1}{2}} - r^2\left[r^2+1\right]^{-\frac{3}{2}}$$

(5) [5 points] Differentiate

$$y = \cot^2(\sin\theta) = \left[\cot(\sin\theta)\right]^2$$

$$\frac{dy}{d\theta} = 2\cot(\sin\theta)\cdot\frac{d}{d\theta}\left[\cot(\sin\theta)\right]$$

$$= 2\cot(\sin\theta)\cdot\left[-\csc^2(\sin\theta)\right]\cdot\frac{d}{d\theta}\left[\sin\theta\right]$$

$$= -2\cot(\sin\theta)\cdot\csc^2(\sin\theta)\cdot\cos\theta$$