MATH 113 – QUIZ 6 – 5 MARCH 2007

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (2 pts. each) Find the derivative of each of the following functions.

(a) $g(t) = \tan(t^2 + 3t)$

$$g'(t) = \sec^2(t^2+3t)\frac{d}{dt}(t^2+3t)$$
$$= (2t+3)\sec^2(t^2+3t) \;//$$

(b) $q(r) = r^2 e^{r^2}$

$$q'(r) = r^2\frac{d}{dr}(e^{r^2}) + e^{r^2}\frac{d}{dr}(r^2)$$
$$= r^2 \cdot 2r e^{r^2} + 2r e^{r^2}$$
$$= 2re^{r^2}(r^2+1) \;//$$

2. (3 pts.) Find $\dfrac{d^2y}{dx^2}$ when $y = \cos(3x^2)$.

$$\frac{dy}{dx} = -\sin(3x^2)\cdot 6x = -6x\sin(3x^2)$$
$$\frac{d^2y}{dx^2} = \frac{d}{dx}(-6x\sin(3x^2)) = (-6x)\frac{d}{dx}(\sin 3x^2) + \sin(3x^2)\frac{d}{dx}(-6x)$$
$$= -6x\cos(3x^2)\cdot 6x + \sin(3x^2)(-6)$$
$$= -36x\cos(3x^2) - 6\sin(3x^2) \;//$$

3. (3 pts.) Find the equation of the tangent line to the curve defined by the parametric equations $x = 2t^2 - 3$, $y = t^3$ at the point defined by $t = 2$.

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{3t^2}{4t} = \frac{3}{4}t$$
$$\left.\frac{dy}{dx}\right|_{t=2} = \frac{3}{2}$$

point : $t=2$: $x=5$ $y=8$

tangent line :

$$y = 8 + \frac{3}{2}(x-5) \;//$$
$$= \frac{3}{2}x + \frac{1}{2} \;//$$