MATH 213 – QUIZ 6 – 6 MARCH 2008

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. (4 pts.) Find the derivatives f_x, f_y, f_{xy} and f_{yx} of $f(x,y) = y + x^2y^2 + 4y^3$.

$$f_x = 2xy^2$$

$$f_y = 1 + 2x^2y + 12y^2$$

$$f_{xy} = \frac{\partial}{\partial y}(2xy^2) = 4xy$$

$$f_{yx} = \frac{\partial}{\partial x}(1 + 2x^2y + 12y^2) = 4xy$$

2. (3 pts.) Find f_{xyz} where $f(x,y,z) = xz\sin(xy)$.

$$f_x = xz(y\cos(xy)) + z\sin(xy)$$

$$= xyz\cos(xy) + z\sin(xy)$$

$$f_{xy} = -x^2yz\sin(xy) + xz\cos(xy) + xz\cos(xy)$$

$$f_{xyz} = -x^2y\sin(xy) + 2x\cos(xy) \;//$$

3. (3 pts.) If $w = \frac{xz}{y^2}$, and if $x = \sin(t)$, $y = \cos(t)$, and $z = e^t$, *use the chain rule* to compute dw/dt. (If you do not use the chain rule, you will receive no credit.)

$$\frac{dw}{dt} = \frac{\partial w}{\partial x}\frac{dx}{dt} + \frac{\partial w}{\partial y}\frac{dy}{dt} + \frac{\partial w}{\partial z}\frac{dz}{dt}$$

$$= \frac{z}{y^2}\cos(t) + \frac{2xz}{y^3}\sin(t) + \frac{x}{y^2}e^t$$

$$= \frac{e^t}{\cos(t)} + \frac{2\sin^2(t)\,e^t}{\cos^3(t)} + \frac{\sin(t)}{\cos^2(t)}e^t \;//$$