Quiz 3

Name: Key

1. For the function $f(x,y) = x^2y + \sin(xy)$, find:

[2] a) f_x $\quad 2xy + y\cos(xy)$

[2] b) f_{xx} $\quad 2y + (y^2)(-\sin(xy))$

[2] c) f_{xy} $\quad 2x + (-yx)\cos(xy) + 1\cdot\cos(xy)$

[2] d) f_y $\quad x^2 + x\cos(xy)$

[2] e) f_{yx} $\quad 2x - xy\cos(xy) + 1\cdot\cos(xy)$

2. For the surface $z = \dfrac{2+x}{3-y}$,

[6] *a)* find the equation of the tangent plane to the surface at $P(1,2,3)$.

$\frac{\partial z}{\partial x} = \frac{1}{3-y}$ (1) $\Rightarrow \left.\frac{\partial z}{\partial x}\right|_P = \frac{1}{3-2} = 1$ (1); $\frac{\partial z}{\partial y} = (2+x)(-1)(3-y)^{-2}\cdot(-1)$ (1)

$\Rightarrow \left.\frac{\partial z}{\partial y}\right|_P = (2+1)(3-2)^{-2} = 3$ (1);

so (2) $\boxed{(z-3) = 1\cdot(x-1) + 3(y-2)}$

[4] *b)* use the tangent plane to find an approximate value of z when $x = 0.998$ and $y = 2.003$.

(2) $z - 3 \cong (0.998 - 1) + 3(2.003 - 2)$

$z - 3 \cong -0.002 + 0.009$

$z - 3 \cong 0.007$

(2) $\boxed{z \cong 3.007}$