Name_____ ID_____

MATH 251   Quiz 3   Fall 2005

Sections 503   P. Yasskin

1-4	/20
5	/ 5
Total	/25

Multiple Choice & Work Out: (5 points each)

1. For the function $f(x,y) = x\cos(xy)$ which partial derivative is incorrect?

a. $\dfrac{\partial f}{\partial x} = \cos(xy) - xy\sin(xy)$

b. $\dfrac{\partial f}{\partial y} = -x^2\sin(xy)$

c. $\dfrac{\partial^2 f}{\partial x^2} = -y\sin(xy) - x^2 y\cos(xy)$

d. $\dfrac{\partial^2 f}{\partial x\partial y} = -2x\sin(xy) - x^2 y\cos(xy)$

e. $\dfrac{\partial^2 f}{\partial y\partial x} = -2x\sin(xy) - x^2 y\cos(xy)$

2. Find the equation of the plane tangent to $z = x^2 y^3$ at the point $(2,1,4)$.

a. $z = -4x - 12y + 24$

b. $z = -4x - 12y + 4$

c. $z = 4x + 12y + 4$

d. $z = 4x + 12y - 8$

e. $z = 4x + 12y - 16$

3. The plane tangent to $z = f(x,y) = xy^2 - x^2$ at the point $(1,2,-3)$ is
$z = f_{tan}(x,y) = 3 + 2(x-1) + 4(y-2)$.   Use this information to approximate $f(1.1,1.8)$.

   a. 2

   b. 2.4

   c. 3.6

   d. 4

   e. 12.4

4. Consider a function $g(x,y)$. If $g(2,3) = 4$, $\dfrac{\partial g}{\partial x} = 5$, and $\dfrac{\partial g}{\partial y} = 1$,
   estimate $g(1.9,3.3)$.

   a. 3.8

   b. 4.2

   c. 4.8

   d. 10

   e. 16.8

5. The mass of a body is $M = \rho V$ where ρ is its density and V is its volume.
   If the density is measured to be $\rho = 1.2\dfrac{g}{cm^3}$ with an uncertainty of $\Delta\rho = \pm 0.01\dfrac{g}{cm^3}$
   and the volume is measured to be $V = 2\,cm^3$ with an uncertainty of $\Delta V = \pm 0.02\,cm^3$,
   then the mass is $M = 2.4\,g$. Use differentials to estimate the uncertainty in the mass.
   NOTE: The uncertainty in a quantity is its differential.