MA 213 Worksheet #10

Section 14.4

1 *14.4.5* Find an equation of the tangent plane to the surface $z = x\sin(x+y)$ at the point $(-1, 1, 0)$.

2 *14.4.9* Given that f is a differentiable function with $f(2,5) = 6$, $f_x(2,5) = 1$ and $f_y(2,5) = -1$, use a linear approximation to estimate $f(2.2, 4.9)$.

3 *14.4.21* Find the linearization of the function $f(x,y,z) = \sqrt{x^2+y^2+z^2}$ at (3,2,6) and use it to approximate the number $\sqrt{(3.02)^2+(1.97)^2+(5.99)^2}$.

4 *14.4.25* Find the differential of the function $z = e^{-2x}\cos 2\pi t$.

5 *14.4.33* The length and width of a rectangle are measured as 30 cm and 24 cm, respectively, with an error in measurement of at most 0.1 cm in each. Use differentials to estimate the maximum error in the calculated area of the rectangle.

Additional Recommended Problems

6 *14.4.1* Find an equation of the tangent plane to the surface $z = 3y^2 - 2x^2$ at the point $(2, -1, -3)$.

7 *14.4.17* Verify the following linear approximation at $(0, 0)$:

$$e^x \cos(xy) \approx x + 1.$$

8 *14.4.35* Use differentials to estimate the amount of metal in a closed cylindrical can that is 10 cm high and 4 cm in diameter if the metal in the top and bottom is 0.1 cm thick and the metal in the sides is 0.05 cm thick.

9 *14.4.42* Suppose you need to know an equation of the tangent plane to a surface S at the point $P(2, 1, 3)$. You don't have an equation for S but you know the curves

$$\mathbf{r}_1(t) = \langle 2+3t, 1-t^2, 3-4t-t^2 \rangle$$

$$\mathbf{r}_2(u) = \langle 1+u^2, 2u^3-1, 2u+1 \rangle$$

both lie on S. Find an equation of the tangent plane at P.