MA 213 Worksheet #11

Section 14.4
10/02/18

1 Find an equation of the tangent plane to the given surface at the specified point.

14.4.1 $z = 2x^2 + y^2 - 5y, \qquad (1, 2, -4)$

2 Explain why the function is differentiable at the given point. Then find the linearization $L(x, y)$ of the function at that point.

14.4.11 $f(x, y) = 1 + x \ln(xy - 5), \qquad (2, 3)$

14.4.13 $f(x, y) = x^2 e^y, \qquad (1, 0)$

3 Verify the linear approximation at $(0, 0)$.

14.4.17 $e^x \cos(xy) \approx x + 1$

4 Find the differential of the function.

14.4.25 $z = e^{-2x} \cos 2\pi t$

14.4.29 $R = \alpha\beta^2 \cos\gamma$

5 *14.4.31* If $z = 5x^2 + y^2$ and (x, y) changes from $(1, 2)$ to $(1.05, 2.1)$, compare the values of Δz and dz.

6 *14.5.33* The length and width of a rectangle are measured as 30cm and 24cm respectively with an error in measurement of at most 0.1cm in each. Use differentials to estimate the maximum error in the calculated area of the rectangle.

7 *14.5.42* 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 that 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.