14.3 Local Linearity and the Differential

Name: Date:

P 5. Find an equation of the tangent plane to the surface $z = \frac{1}{2}(x^2 + 4y^2)$ at the point $(2, 1, 4)$.

P 6. Find an equation of the tangent plane to the surface $x^2 + y^2 - z = 1$ at the point $(1, 3, 9)$.

P 11. Find the differential of $z = e^{-x} \cos y$.

P 18. A student was asked to find an equation of the tangent plane to the surface $z = x^3 - y^2$ at the point $(x, y) = (2, 3)$. The student's answer was

$$z = 3x^2(x - 2) - 2y(y - 3) - 1.$$

(a) At a glance, how do you know this is wrong?

(b) What mistake did the student make?

(c) Answer the question correctly.

P 25. An unevenly heated plate has temperature $T(x, y)$ in $^\circ C$ at the point (x, y). If $T(2, 1) = 135$, and $T_x(2, 1) = 16$, and $T_y(2, 1) = -15$, estimate the temperature at the point $(2.04, 0.97)$.