14.4 Videos Guide

14.4a

- Equation of a tangent plane to a surface $z = f(x, y)$ at the point $P(x_0, y_0, z_0)$
  $z - z_0 = f_x(x_0, y_0)(x - x_0) + f_y(x_0, y_0)(y - y_0)$

Exercise:

- Find an equation of the tangent plane to the surface $z = \ln(x - 2y)$ at the point $(3, 1, 0)$.

14.4b

- The linearization or linear approximation to a surface S given by $z = f(x, y)$ at the point $P(a, b)$
  $f(x, y) \approx L(x, y) = f(a, b) + f_x(a, b)(x - a) + f_y(a, b)(y - b)$

Exercise:

- Explain why the function $f(x, y) = \sqrt{xy}$ is differentiable at the point $(1, 4)$. Then find the linearization $L(x, y)$ of the function at that point.

14.4c

- The total differential dz
  $dz = f_x(x, y)dx + f_y(x, y)dy$

14.4d

Exercise:

- If $z = x^2 - xy + 3y^2$ and (x, y) changes from $(3, -1)$ to $(2.96, -0.95)$, compare the values of Δz and dz.