Lecture 12 Worksheet

June 7, 2021

1. Find the equation of the tangent plane to the surface at the given point.
   (a) $z = \ln(x - 2y), (5, 2, 0)$
   (b) $z = e^{x+2y}, (-2, 1, 1)$
2. Find the differential of
   (a) $z = \tan^{-1}(\frac{y}{x})$
   (b) $z = \ln(\frac{y}{x})$
3. Use the linear approximation to $f(x, y) = \sqrt{x^2 + y^2}$ at $(-4, 3)$ to estimate $f(-4.1, 3.2)$. Compare the estimate to the actual value.
4. Use the differential dz to approximate the change in $z = f(x, y) = x^2 + 3xy - y^2$ as x changes from 2.00 to 2.05 and y changes from 3.00 to 2.96.
5. The volume of a cylinder is given by $V(r, h) = \pi r^2 h$. Use differentials to estimate the volume of aluminum in an enclosed aluminum can with diameter 8 cm and height 12 cm if the aluminum is 0.04 cm thick.