

## Math 32 – Workshop #17

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- Find  $\frac{\partial z}{\partial x}$  and  $\frac{\partial z}{\partial y}$ . Introduce new variables as needed to show the composition and your use of the chain rule.
  - $z = f(2x^2 + 4y)$
  - $z = f\left(\frac{x}{y}\right)$
  - $z = f\left(xy, \frac{x}{y}\right)$
- Consider the surface defined by the function  $f(x, y) = 2x^2 + 3xy + 4y^2$ . In what direction is the maximum rate of change? What is the actual maximum rate of change?
- Set  $f(x, y) = \sin(x) \cos(x)$ .
  - Find the gradient of  $f$ . Is this a vector or a scalar? What notation is used to denote the gradient?
  - Find the directional derivative of  $f$  in the direction of  $\vec{v} = \langle 4, -3 \rangle$  at the point  $P\left(\frac{\pi}{3}, \frac{-2\pi}{3}\right)$ . Is this a vector or a scalar? What notation is used to denote the directional derivative?