Math 283 Quiz 6 Section 1: Oct 17
Name: SAToko

If you cannot complete a problem (perhaps because you forgot a formula) but you think you know how, please describe. Correct methods will receive partial credits.

1. We consider the surface \( z = x/y \) near the point \((4, 1)\).
   (a) What is the value of \( z \) at \((4, 1)\)?
   \[
   z = \frac{4}{1} = 4.
   \]
   (b) Find the first order partial derivatives of \( z \) with respect to \( x \) and \( y \) (i.e. find \( z_x(4, 1) \) and \( z_y(4, 1) \)).
   \[
   z_x(x, y) = \frac{\partial z}{\partial x}(x, \frac{1}{y}) = \frac{1}{y} \frac{\partial}{\partial x} x = \frac{1}{y}; \quad z_x(4, 1) = 1.
   \]
   \[
   z_y(x, y) = \frac{\partial z}{\partial y}(x, \frac{1}{y}) = x(-1) \left( \frac{1}{y^2} \right) = -\frac{x}{y^2}; \quad z_y(4, 1) = -4.
   \]
   (c) Write an equation of the tangent plane to \( z \) at \((4, 1)\).
   \[
   z - 4 = \frac{1}{y} (x - 4) - 4(y - 1).
   \]

2. Use the chain rule to find \( dz/dt \).
   \[
   z = \sin(2x - y), \quad x = t^2, \quad y = 1 + 2t
   \]
   \[
   \frac{dz}{dt} = \frac{\partial z}{\partial x} \cdot \frac{dx}{dt} + \frac{\partial z}{\partial y} \cdot \frac{dy}{dt},
   \]
   \[
   \frac{\partial z}{\partial x} = \cos(2x - y) \cdot 2, \quad \frac{\partial z}{\partial y} = \cos(2x - y) \cdot (-1)
   \]
   \[
   \frac{dx}{dt} = 2t, \quad \frac{dy}{dt} = 2
   \]
   \[
   \frac{dz}{dt} = 4t \cos(2x - y) - 2 \cos(2x - y).
   \]