

$dx = \Delta x = 0.05$ ,  $dy = \Delta y = -0.1$ ,  $z = 4x^2 + y^2$ ,  $z_x = 8x$ ,  $z_y = 2y$ . Thus  
when  $x = 1$  and  $y = 2$ ,  
 $dz = z_x(1, 2) dx + z_y(1, 2) dy = (8)(0.05) + (4)(-0.1) = 0$  while  
 $\Delta z = f(1.05, 1.9) - f(1, 2) = 4(1.05)^2 + (1.9)^2 - 4 - 4 \approx 0.020$ .