SOLUTIONS

200-204 Quiz 3 (10 points)

NAME: 

UBC ID: 

1. Sketch the graph of the surface $x^2 + y^2 - z^2 = 1$. (hint: first sketch the graph on $xz$-plane, then rotate this graph around one axis) (4 points)

$$x^2 - y^2 = 1 \implies x^2 + y^2 = z^2 = 1$$

(Not necessary)

2. Given the surface $z = \ln(x + 2y) + \sin(x + y)$,
   
   (a) find the tangent plane at $(-1, 1, 0)$; (3 points)
   
   (b) approximate $z$ when $x = -1.01, y = 1.02$. (3 points)

   a). \[
   \frac{\partial z}{\partial x} = \frac{1}{x + 2y} + \cos(x + y), \quad \frac{\partial z}{\partial y} = \frac{2}{x + 2y} + \cos(x + y).
   \]

   at $(-1, 1)$: \[
   \frac{\partial z}{\partial x} = 2, \quad \frac{\partial z}{\partial y} = 3
   \]

   tangent plane: \[
   z = 2(x+1) + 3(y-1) = 2x + 3y - 1
   \]

   b). \[
   z(-1.01, 1.02) = z(-1, 1) + \frac{\partial z}{\partial x}(-0.01) + \frac{\partial z}{\partial y}(0.02)
   \]

   $= 0 + 2(-0.01) + 3(0.02) = 0.04$