Quiz 6 (20mins, 20pts)

Please write down your name, SID, and solutions discernably.

Name : SID : Score :

1. (6pts : 3pts each) Use the Chain Rule to find dz/dt for a) and $\partial z/\partial s$, $\partial z/\partial t$ for b).

a) $z = \dfrac{x^3 - x\ln y + y}{\sin y}, \quad x = e^t,\ y = t^2$

b) $z = x\sin\theta, \quad x = \dfrac{s}{t},\ \theta = s^2 + t$

2. (9pts : 3pts each) Find dy/dx for a) and $\partial z/\partial x$, $\partial z/\partial y$ for b) and c).

a) $x^2 + \sin x \sin y - y^2 = 0$

b) $x + y^2 + z^3 = 0$

c) $\tan x + e^y + z^3 - z^2 = 0$

3. (5pts) Find the gradient of f, evaluate the gradient at the point P, and find the rate of change of f at P in the direction of the vector $\mathbf{u}$.

$$f(x, y, z) = \cos(x^2) + xy + \ln z, \quad P = (\pi, 1, e) \quad \mathbf{u} = \left\langle \frac{1}{9}, -\frac{8}{9}, \frac{4}{9} \right\rangle$$