Name: _____ Monday, March 31, 2014

MA1024 D03 **Quiz 2**

1. (**6 marks**) Find the maximum and minimum values of $f(x, y) = 12x^2 + 13y^2$ on the disk $D = \{(x, y) : x^2 + y^2 \leq 1\}$.

Same as D07 (see other solutions).

This quiz has two sides!!!

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2. (**4 marks**) Let $w = \ln(u + v + z)$, where $u = \cos^2 t$, $v = \sin^2 t$ and $z = t^2$. Using the chain rule, find dw/dt.

$$\frac{du}{dt} = -2\cos t \sin t \quad , \quad \frac{dv}{dt} = 2\sin t \cos t \quad , \quad \frac{dz}{dt} = 2t$$

$$\frac{\partial w}{\partial u} = \frac{1}{(u+v+z)}(1) \quad , \quad \frac{\partial w}{\partial v} = \frac{1}{(u+v+w)}(1) \quad , \quad \frac{\partial w}{\partial z} = \frac{1}{u+v+w}(1)$$

$$\frac{dw}{dt} = \frac{\partial w}{\partial u}\frac{du}{dt} + \frac{\partial w}{\partial v}\frac{\partial v}{\partial t} + \frac{\partial w}{\partial z}\frac{dz}{dt}$$

$$= \frac{1}{(\cos^2 t + \sin^2 t + t^2)}\left(-2\cos t \sin t + 2\sin t \cos t + 2t\right)$$

$$\frac{dw}{dt} = \frac{2t}{(1 + t^2)}$$