

Math. 2673 Supplementary Problems Fall,2006

Please do the following:

I .) let $\mu = f(x, y)$, where $x = e^s \cos(t)$ and $y = e^s \sin(t)$

show that

$$\frac{\partial^2 \mu}{\partial x^2} + \frac{\partial^2 \mu}{\partial y^2} = e^{-2s} \left[\frac{\partial^2 \mu}{\partial s^2} + \frac{\partial^2 \mu}{\partial t^2} \right]$$

II.) let $z = f(x, y)$, where $x = r \cos(\theta)$ and $y = r \sin(\theta)$

find

a.) $\frac{\partial z}{\partial r}$

b.) $\frac{\partial z}{\partial \theta}$

c.) $\frac{\partial^2 z}{\partial r \partial \theta}$

III.) let $z = f(x, y)$, where $x = g(s, t)$ and $y = h(s, t)$

find

a.) $\frac{\partial^2 z}{\partial s \partial t}$

b.) $\frac{\partial^2 z}{\partial s^2}$