Name: _____ **Surface Color:** _____

Task Master: _____ **Cynic:** _____ **Recorder:** _____

MTH 254 **CHAIN RULE MEASUREMENTS** Spring 2015

Working in small groups (3 or 4 people), solve as many of the problems below as possible. Try to resolve questions within the group before asking for help. Each group member should then write up the solutions in their own words; Show your work! Full credit will only be given if your answer is supported by calculations and/or explanations as appropriate.

1. **Measurement**

   (a) Using the measurement tool, find the rate of change in the surface in the x-direction at the **blue** dot on your surface. Include units.

   $$\frac{\partial f}{\partial x} = \_\_\_\_\_$$

   (b) Using the measurement tool, find the rate of change in the surface in the y-direction at the **blue** dot on your surface. Include units.

   $$\frac{\partial f}{\partial y} = \_\_\_\_\_$$

   (c) Using the measurement tool, find the rate of change in the surface in the r-direction at the **blue** dot on your surface. Include units.

   $$\frac{\partial f}{\partial r} = \_\_\_\_\_$$

2. **Computation**

   (a) What are the *rectangular* coordinates of the blue dot (on the contour mat)?

   $$(x, y) = \_\_\_\_\_$$

   (b) What are the *polar* coordinates of the blue dot (on the contour mat)?

   $$(r, \phi) = \_\_\_\_\_$$

   (c) Use the chain rule to express $\frac{\partial f}{\partial r}$ in terms of $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$.

   $$\frac{\partial f}{\partial r} = \_\_\_\_\_$$

3. **Comparison**

   - Compare your answers.