

Name: _____

Surface Color: _____

Task Master: _____ Cynic: _____ Recorder: _____

MTH 254

DIRECTIONAL DERIVATIVES

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.

$$\frac{\partial f}{\partial x} = \underline{\hspace{2cm}}$$

- (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.

$$\frac{\partial f}{\partial y} = \underline{\hspace{2cm}}$$

- (c) Draw an arbitrary vector \vec{u} at the blue dot *on the contour mat*. What are its components?

$$\vec{u} = \underline{\hspace{2cm}}$$

- (d) Using the measurement tool, find the rate of change in the surface in the \vec{u} -direction. Include units.

$$\frac{df}{ds} = \underline{\hspace{2cm}}$$

2. Computation

- (a) Determine the gradient of f at the blue dot.

$$\vec{\nabla} f = \underline{\hspace{2cm}}$$

- (b) Use the Master Formula to express $\frac{df}{ds}$ in terms of $\vec{\nabla} f$, and compute the result.

$$\frac{df}{ds} = \underline{\hspace{2cm}}$$

3. Comparison

- Compare your answers.