

Name: Solution key

Panther ID: _____

Quiz 10/04

MAC-2313

Fall 2018

1. (6 pts) Let $z = x^2 + xe^{-y^2}$. Find each of the following:

(a) $\frac{\partial z}{\partial x} = 2x + e^{-y^2}$

(b) $\frac{\partial z}{\partial y} = -2xye^{-y^2}$

(c) $\frac{\partial^2 z}{\partial y^2} = -2xe^{-y^2} - 2xy \cdot (-2y)e^{-y^2} \leftarrow$ ok like that

so $\frac{\partial^2 z}{\partial y^2} = e^{-y^2}(4xy^2 - 2x) = \underline{2xe^{-y^2}(2y^2 - 1)}$

2. (3 pts) The temperature at a point (x, y) on a metal plate in the xy -plane is given by $T(x, y) = 2x^2 - y^3 + x$ degrees Celsius. Assume x, y are measured in centimeters.

(a) (1 pt) What is the temperature at the point $(2, 1)$?

$$T(2, 1) = 2 \cdot 2^2 - 1 + 2 = 9^\circ\text{C}$$

(b) (2 pts) What is the rate at which the temperature changes with respect to distance if we start at the point $(2, 1)$ and move parallel to the x -axis in the direction of increasing x ? Give units to your answer.

rate of change = $\frac{\partial T}{\partial x}(2, 1)$ $\frac{\partial T}{\partial x} = 4x + 1$ $\frac{\partial T}{\partial x}(2, 1) = 9^\circ\text{C/cm}$

3. (2 pts) Specify the domain of the function $f(x, y) = 4 - x^2 - y^2$ and sketch its graph.

Domain: all \mathbb{R}^2 (all points (x, y) in the plane)

Graph of $f(x, y) \Leftrightarrow$ graph of $z = 4 - x^2 - y^2 \leftarrow$ paraboloid concave down

