

Math 250B X02 Test Two

Time: 50 minutes

Total: 16 marks

Name: _____

1. [3 marks] Ground temperature (in °C) is given by $f = 21 - 0.4x^2 + 0.3y^2$, where x and y are measured in km.

a) From $(x, y) = (5, 6)$ head towards $(x, y) = (12, 9)$. What is the initial rate of change of temperature?

b) From $(x, y) = (5, 6)$, in which direction does f increase fastest?

2. [3 marks] Set up a **triple integral** for the following volume.

Do not evaluate the integral.

The volume bounded by $z = y^2, x + z = 25, x = 0$

3. [5 marks] Solve the following problem using **Lagrange Multipliers**.
Given $2x - y + 2z = 10$, find the values x, y, z that minimize
 $f = (x - 7)^2 + (y + 7)^2 + (z - 7)^2$.

4. [5 marks] Use a **double integral in polar coordinates** to calculate the volume between $z = \sqrt{x^2 + y^2}$ and $z = \sqrt{32 - x^2 - y^2}$