

TEST 2

2013-07-24

NAME: _____

This test is closed books, closed notes. Read through the entire thing first and distribute your time wisely. Fully justify your answers and show all work in order to maximize your partial credit.

This test has 60 points in six (6) problems. Make sure you have all the pages right away.

1 (10 points). Find $D_{\mathbf{u}}f(-1, 2)$ if $f(x, y) = \ln(4 + x^2 + y^2)$ and \mathbf{u} is parallel to $\langle 2, 1 \rangle$.

0

2 (10 points). Find an equation of the plane tangent to the surface S at the point $(2, 3, \sqrt{23})$ if S is the sphere of radius 6 centered at the origin.

$$2x + 3y + \sqrt{23}z = 36$$

3 (10 points). Find all absolute maxima and absolute minima of the function

$$f(x, y) = x^2 + 4y^2 + 2x + 4y$$

on the closed set bounded by the ellipse

$$x(t) = 4 \cos(t)$$

$$y(t) = 2 \sin(t)$$

for $t \in [0, 2\pi]$.

Absolute min -2 at $(-1, -1/2)$, absolute max $16 + 8\sqrt{2}$ at $(2\sqrt{2}, \sqrt{2})$ (or $t = \pi/4$)

4 (10 points). Evaluate the integral

$$\int_0^2 \int_0^{4-x^2} \frac{xe^{2y}}{4-y} dy dx.$$

$$\frac{e^8 - 1}{4}$$

5 (10 points). Find the mass of the solid ball of radius 1 centered at the origin if the density is given by the function

$$\delta(x, y, z) = e^{-(x^2+y^2+z^2)^{3/2}}$$

$$\frac{4\pi(e-1)}{3e}$$

6 (10 points). Find the coordinates of the centroid of R , where R is the region in the xy -plane bounded by $y = 1 - |x|$ and the x -axis.

$(0, 1/3)$