United Arab Emirates University
College of Sciences, Department of Mathematical Sciences
Calculus III
Fall Semester $2009 - 2010$, Final

Section: 51
ID Number:
Name:

1. Let $f(x, y) = \ln(4x - 5y)$. Show that $f_{xy} = f_{yx}$

2. Find three positive numbers whose sum is 27 and such that the sum of their squares is as small as possible.

3. Find an equation of the plane that is through the point $(-1, 4, -3)$and perpendicular to the line

$$x - 2 = t, \quad y + 3 = 2t, \quad z = -t$$

4. Evaluate the iterated integral

$$\int_0^1 \int_0^1 \frac{x}{(xy + 1)^2} dy dx$$

5. Evaluate the iterated integral by using polar coordinates

$$\int_0^1 \int_0^{\sqrt{1-x^2}} (x^2 + y^2)^{3/2} dy dx$$

6. Evaluate the triple integrals

$$\int_1^3 \int_x^{x^2} \int_0^{\ln z} x e^y \, dy \, dz \, dx$$

7. Let

$$\mathbf{u} = i, \quad \mathbf{v} = i + j, \quad \mathbf{w} = i + j + k$$

Compute

$$\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w}) = ?$$

8. Determine whether the line

$$x = 3 + 8t, \quad y = 4 + 5t, \quad z = -3 - t$$

is parallel to the plane $x - 3y + 5z = 12$