Quiz 4

May 17 2005, Show all details.

1. The derivative of $f(x, y)$ at a point P is greatest in the direction of $(3/5, 4/5)$. In this direction the value of the directional derivative is 2. What is ∇f at P? What is the derivative of f in the direction of $(3/5, -4/5)$?

2. Assume that $f(x, y)$ is continuous together with all its partial derivatives of all orders. State (need not prove) the second derivative test.

3. Find the absolute maxima and minima of $x^2 - xy + y^2$ on $[-1, 2] \times [-2, 1]$.

4. Write down the equations for maximizing/minimizing x^2+y^2-z subject to $x+y+z = 0$ and $y^2 + z^2 = 1$ using the method of Lagrangian multipliers. Indicate number of equations and number of unknowns. DO NOT SOLVE IT.

5. Find the corresponding upper and lower limits of integration for $\int\int\int 1 dxdydz$ which corresponds to the volume of the tetrahedron in the first octant bounded by the coordinate planes and $x/3 + y/2 + z = 1$. NEED NOT find the value of the integral.

6. Evaluate

$$\int_{-1}^{1}\int_{0}^{\sqrt{1-y^2}} \frac{\sqrt{x^2+y^2}}{1+x^2+y^2} dxdy$$

Calculus II, Spring 2005

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