Mount Allison University
Department of Mathematics and Computer Science
16th November, 2009
MATH2111 - Test #2 Make-Up
Time allowed: 45 minutes

Last Name:_____

First Name:_____

Record your answers below each question in the space provided. Left-hand pages may be used as scrap paper for rough work. If you want any work on the left-hand pages to be graded, please indicate so on the right-hand page.

Partial credit will be awarded for partially correct work. Be sure to show your work, and include all necessary justifications needed to support your arguments.

For grader's use only:

Q	Mark
1	/10
2	/8
3	/12
4	/10
5	/10
Total	/50

1. Compute the first-order partial derivatives of the following functions:

[2] (a) $f(x, y) = y \ln(x^2 + y^2)$

[4] (b) $f(x, y) = \dfrac{xy}{x + y^2}$

[4] (c) $f(x, y) = \sqrt{x^2 + y + 4}$

[8] 2. Compute all second-order partial derivatives of the function $f(x, y) = e^{-x^2-y^2}$.

3. Let $f(x, y) = \sqrt{y^2 - x^2}$.

[4] (a) Find and sketch the domain of f.

[4] (b) If $z = f(x, y)$, compute the differential dz.

[4] (c) Find the linear approximation to $f(x, y)$ at the point $(2, 1)$.

4. Find the derivative of the given function f at the given point P in the direction of the given vector $\vec{\mathbf{v}}$:

[5] (a) $f(x, y) = y^2 \ln x$, $P(1, -2)$, $\vec{\mathbf{v}} = \langle -3, 4 \rangle$.

[5] (b) $f(x, y, z) = xe^{2yz}$, $P(3, 0, 2)$, $\vec{\mathbf{v}} = \left\langle \frac{2}{3}, -\frac{2}{3}, \frac{1}{3} \right\rangle$.

5. Let $g(x, y, z) = 4x^2 - y^2 - 9z^2$.

[3] (a) Compute the gradient $\nabla g(x, y, z)$ of g.

[4] (b) Find the equation of the tangent plane to the level surface $g(x, y, z) = 36$ at the point $(1, 2, 2)$

[3] (c) Sketch the level surface $g(x, y, z) = 36$.