18.02 Multivariable Calculus
Fall 2007

18.02 Problem Set 6

Due Thursday 10/18/07, 12:45 pm.

Part A (8 points)

Hand in the underlined problems only; the others are for more practice.

Lecture 15. Thu Oct. 11 Non-independent variables.
Read: Notes N (pp. 0–5).
Work: 2J/ 1, 2, 3ab, 4ab, 5a, 6, 7.

Lecture 16. Fri Oct. 12 Partial differential equations. Review.
Read: Notes P.
Work: 2K/ 1, 2, 3, 4, 5.

Lecture 17. Tue Oct. 16 **Exam 2 covering lectures 9–16**

Part B (8 points)

Directions: Attempt to solve *each part* of each problem yourself. If you collaborate, solutions must be written up independently. It is illegal to consult materials from previous semesters. With each problem is the day it can be done.

Write the names of all the people you consulted or with whom you collaborated and the resources you used.

Problem 1. (Thursday, 4 points)

Suppose that $g(x, y) = c$ a constant and $w = f(x, y, z)$. Which of the following makes sense as the derivative $\partial w/\partial x$? (If so, compute it in terms of the formal derivatives f_x, f_y, f_z, g_x, and g_y. If not, explain why not.)

i) $\left(\dfrac{\partial w}{\partial x}\right)_x$ ii) $\left(\dfrac{\partial w}{\partial x}\right)_y$ iii) $\left(\dfrac{\partial w}{\partial x}\right)_z$

Problem 2. (Thursday, 4 points: 2+2)

a) Suppose that $t = \sin(x + y)$ and $w = x^3yt$. Find $(\partial w/\partial t)_x$.

b) Consider the curve of points (x, y, z) satisfying $x^5 + yz = 3$ and $xy^2 + yz^2 + zx^2 = 7$. Use the method of total differentials to find dx/dy at $(x, y, z) = (1, 1, 2)$.