

# Homework and Quiz 8

Due Monday, July 13, 2009

## Ungraded homework

For practice, you should try:

Section 15.5, page 943, problems 3, 5, 7, 9, 13, 21, 23, 39, 43.

Section 15.6, page 956, problems 7, 9, 11, 13, 15, 19, 21, 23.

Are you doing the homework problems? If not, you are in trouble. I can only tell you *about* the journey you are taking—you must walk the path yourself.

## Graded Quiz

(a) Define functions

$$\begin{aligned}f(x, y) &= xy + y^2, \\g(t) &= t^2, \\h(t) &= \cos t.\end{aligned}$$

Compute  $\frac{d}{dt}f(g(t), h(t))$ .

(b) Define functions

$$\begin{aligned}f(x, y) &= \cos(x^2 + y), \\g(s, t) &= st, \\h(s, t) &= s^2t.\end{aligned}$$

Compute  $\frac{\partial}{\partial s}f(g(s, t), h(s, t))$  and  $\frac{\partial}{\partial t}f(g(s, t), h(s, t))$ .

(c) Define functions

$$\begin{aligned}f(x, y, z) &= xyz, \\g(s, t, u) &= stu, \\h(s, t, u) &= s^2 + t^2 + u^2.\end{aligned}$$

Compute the partial derivatives of

$$f(g(s, t, u), g(s, t, u), h(s, t, u))$$

with respect to  $s$ ,  $t$ , and  $u$ .

(d) Define  $f : \mathbb{R}^3 \rightarrow \mathbb{R}$  by

$$f(x, y, z) = \frac{x^2 + z + 1}{y}.$$

Find the gradient of  $f$  at the point  $(1, 1, 1)$ .

(e) Find the direction derivative of  $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ ,

$$f(x, y) = \sin(xy)$$

at the point  $(0, 0)$  and in the direction  $(2, 3)$ .