

# Assignment 16 (2/17)

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## Problem 1

Problems 15.4.(5, 19, 20, 41, 61, 62).

## Problem 2

Note that  $\frac{\partial^2}{\partial x \partial y} f$  etc. are called second order partial derivatives.

Problems 15.6.(2, 8, 27(a, b, c, e, g), 29, 30).

## Problem 3

**A Chain Rule:** Let  $f(x, y)$  be a function of  $x$  and  $y$  and let  $g(u)$  be a function of single variable defined on the range of  $f$ . Consider the composition  $h = g \circ f$ . Then setting  $u = f(x, y)$ , we have

$$\frac{\partial h}{\partial x} = \frac{dg}{du} \frac{\partial u}{\partial x} \text{ and } \frac{\partial h}{\partial y} = \frac{dg}{du} \frac{\partial u}{\partial y}$$

**Example:** Let  $f(x, y) = xy$ ,  $g(u) = u^2$ . Thus  $h(x, y) = (xy)^2$ . And

$$\frac{\partial h}{\partial x} = \frac{dg}{du} \frac{\partial u}{\partial x} = 2u \frac{\partial u}{\partial x} = 2(xy) \frac{\partial(xy)}{\partial x} = 2xy y = 2xy^2$$

It is straightforward to check that this matches up with  $\frac{\partial(xy)^2}{\partial x}$ .

Now do problem 15.6.24.