

**HW 4**  
**Math 261, F17**

Please see the course syllabus for details on how to turn in your homework assignments. This one is due at the beginning of your class on **Wednesday, September 27.**

1. Suppose function  $f(x, y)$  depends on variables  $x$  and  $y$ , which are themselves functions of variables  $\alpha$  and  $\beta$  (i.e.,  $x = x(\alpha, \beta)$  and  $y = y(\alpha, \beta)$ ). Fill in the blanks for the chain rule to compute  $\frac{\partial f}{\partial \beta}$ :

$$\frac{\partial f}{\partial \beta} = \frac{\partial \square}{\partial \square} \frac{\partial \square}{\partial \square} + \frac{\partial \square}{\partial \square} \frac{\partial \square}{\partial \square}$$

2. Let

$$g(u, v) = u^2 - 3uv + v^3,$$

$$u(t) = \cos(t),$$

$$v(t) = e^t.$$

Compute  $\frac{dg}{dt}$ . (Please use only the variable  $t$  in your response, but do not bother multiplying everything out.)

3. Find the derivative of  $f(x, y) = 2xy - 3y^2$  at point  $(1, 2)$  in the direction of  $\mathbf{v} = \langle 5, 12 \rangle$ . Please simplify your answer to a number. (Notice that  $\mathbf{v}$  is not a unit vector!)

Since you have only 5 days for this homework set *and* a few sections needed to postpone problems from HW 3 to HW 4, there are only 3 problems this week. As usual, be sure to try other suggested problems from the course website to fill in any topics that are missing from the homework and for more practice on the topics covered by HW 4!