

HW 4
Math 261, F18

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 **Friday, September 28**.

1. Suppose function $f(x, y)$ depends on variables x and y , which are themselves functions of variables α , β , and γ (i.e., $x = x(\alpha, \beta, \gamma)$ and $y = y(\alpha, \beta, \gamma)$). 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

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

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

$$v(t) = \ln(t).$$

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

3. Suppose z is a function of x and y and that $x^2 z^2 + y \sin(z) = 1$. Find $\frac{\partial z}{\partial x}$.
4. Find the derivative of $f(x, y) = xy - y^2$ at point $(1, 2)$ in the direction of $\mathbf{v} = \langle 3, 4 \rangle$. Please simplify your answer to a number. (Notice that \mathbf{v} is not a unit vector!)