
1 (10 pts). Suppose $f(x, y)$ is a differentiable function of x and y . Use the table of values to find $g_u(0, 0)$ and $g_v(0, 0)$ if $g(u, v) = f(4u + 5v, 1 + 2u - 3v)$.

	f	g	f_x	f_y
$(0, 0)$	1	-4	13	-7
$(0, 1)$	-4	3	2	-6

Solution: 1. (Source: 14.5.15,16)

Let $x(u, v) = 4u + 5v$ and $y(u, v) = 1 + 2u - 3v$. When $(u, v) = (0, 0)$, $(x, y) = (0, 1)$. (That's why $g(0, 0) = f(0, 1)$ in the table.) By the Chain Rule,

$$g_u(0, 0) = f_x(0, 1)x_u(0, 0) + f_y(0, 1)y_u(0, 0) = 2(4) - 6(2) = -4,$$

and

$$g_v(0, 0) = f_x(0, 1)x_v(0, 0) + f_y(0, 1)y_v(0, 0) = 2(5) - 6(-3) = 28.$$