

Letting  $u = x + y$  and  $v = x - y$ , we have  $x = \frac{1}{2}(u + v)$  and  $y = \frac{1}{2}(u - v)$ . Then  $\frac{\partial(x, y)}{\partial(u, v)} = \begin{vmatrix} 1/2 & 1/2 \\ 1/2 & -1/2 \end{vmatrix} = -\frac{1}{2}$  and  $R$  is the image of the rectangle enclosed by the lines  $u = 0$ ,  $u = 10$ ,  $v = 0$ , and  $v = 9$ . Thus

$$\begin{aligned} \iint_R 7(x + y) e^{x^2 - y^2} dA &= 7 \int_0^{10} \int_0^9 u e^{uv} \left| -\frac{1}{2} \right| dv du = \frac{7}{2} \int_0^{10} [e^{uv}]_{v=0}^{v=9} du \\ &= \frac{7}{2} \int_0^{10} (e^{9u} - 1) du = \frac{7}{2} \left[ \frac{1}{9} e^{9u} - u \right]_0^{10} \\ &= \frac{7}{2} \left( \frac{1}{9} e^{90} - 10 - \frac{1}{9} \right) = \frac{7}{18} (e^{90} - 91) \end{aligned}$$