

1–6 Find the Jacobian of the transformation.

1. $x = 5u - v$, $y = u + 3v$ 2. $x = uv$, $y = u/v$

3. $x = e^{-r} \sin \theta$, $y = e^r \cos \theta$ 4. $x = e^{s+t}$, $y = e^{s-t}$

7–10 Find the image of the set S under the given transformation.

7. $S = \{(u, v) \mid 0 \leq u \leq 3, 0 \leq v \leq 2\}$;
 $x = 2u + 3v$, $y = u - v$

8. S is the square bounded by the lines $u = 0$, $u = 1$, $v = 0$,
 $v = 1$; $x = v$, $y = u(1 + v^2)$

11–16 Use the given transformation to evaluate the integral.

11. $\iint_R (x - 3y) dA$, where R is the triangular region with
vertices $(0, 0)$, $(2, 1)$, and $(1, 2)$; $x = 2u + v$, $y = u + 2v$

19–23 Evaluate the integral by making an appropriate change of variables.

19. $\iint_R \frac{x - 2y}{3x - y} dA$, where R is the parallelogram enclosed by
the lines $x - 2y = 0$, $x - 2y = 4$, $3x - y = 1$, and
 $3x - y = 8$

20. $\iint_R (x + y)e^{x^2 - y^2} dA$, where R is the rectangle enclosed by the
lines $x - y = 0$, $x - y = 2$, $x + y = 0$, and $x + y = 3$