Find the Jacobian of the transformation.

1) $x = u + 4v$, $y = 3u - 2v$

$$\boxed{-14}$$

2) $x = e^u \sin v$, $y = e^u \cos v$

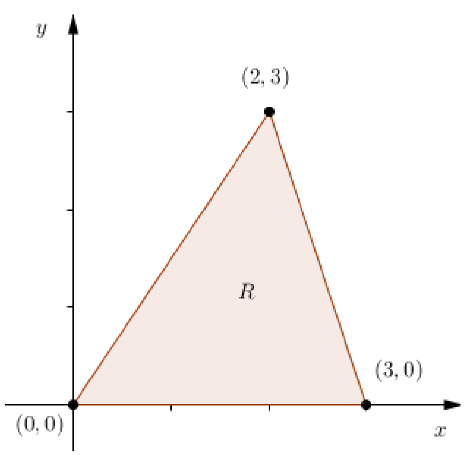
$$\boxed{-e^{2u}}$$

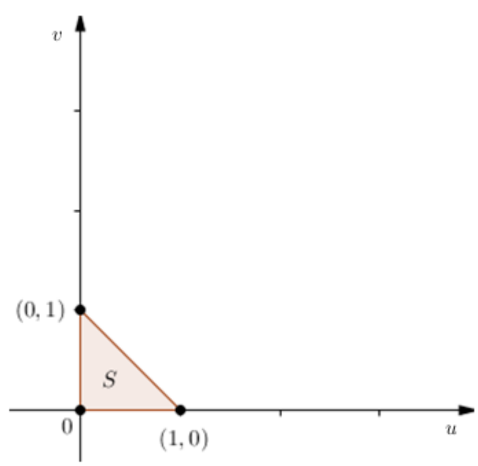
3) $x = uv$, $y = vw$, $z = uw$

$$\boxed{2uvw}$$

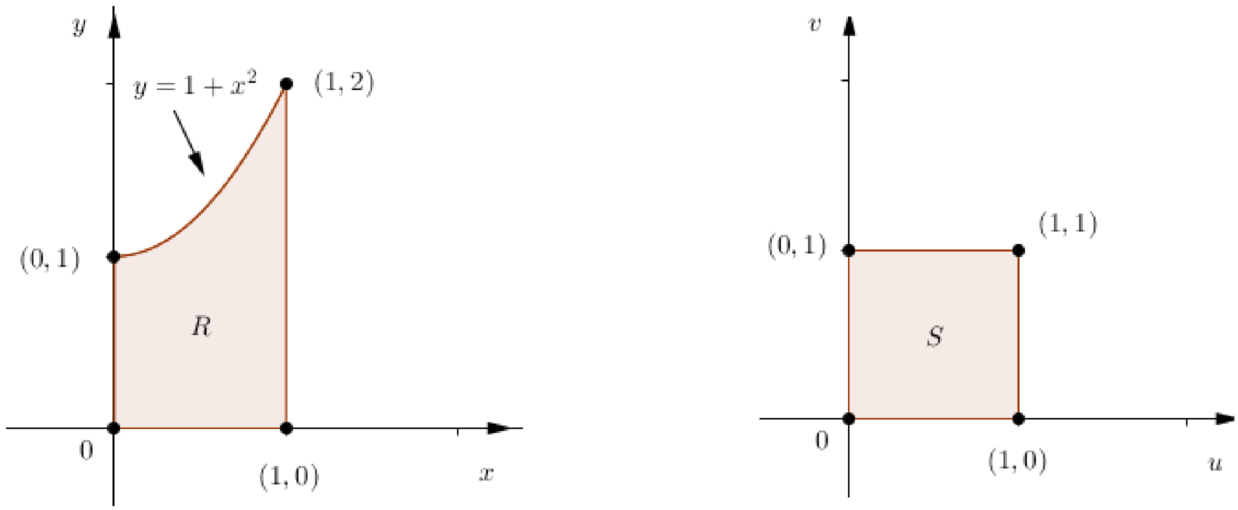
Sketch the image S **in the** uv-plane **of the region** R **in the** xy-plane **using the given transformations.**

4) $x = 3u + 2v$
$y = 3v$





5) $x = v$
$y = u(1+v^2)$



Use the given transformation to evaluate the integral.

6) $\iint_R (4x+8y)\, dA$, where R is the parallelogram with vertices $(-1,3)$, $(1,-3)$, $(3,-1)$, and $(1,5)$; $x = \frac{1}{4}(u+v)$, $y = \frac{1}{4}(v-3u)$.

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7) $\iint_R (x^2 - xy + y^2)\ dA$, where R is the region bounded by the ellipse $x^2 - xy + y^2 = 2$; $x = \sqrt{2}u - \sqrt{\frac{2}{3}}v$, $y = \sqrt{2}u + \sqrt{\frac{2}{3}}v$.

$$\boxed{\frac{4\pi}{\sqrt{3}}}$$

Evaluate the integral by making an appropriate change of variables.

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

$$\boxed{\frac{8}{5}\ln 8}$$

9) $\iint_R (x+y)e^{x^2-y^2}\ dA$, where R is region enclosed by the rectangle with vertices: $\left(\frac{3}{2},\frac{3}{2}\right)$, $\left(\frac{5}{2},\frac{1}{2}\right)$, $(0,0)$, and $(1,-1)$.

$$\boxed{\frac{1}{4}(e^6-7)}$$

10) $\iint_R \sqrt{x^2+3xy-4y^2}\ dA$, where R is the region bounded by the parallelogram with vertices: $(0,0)$, $(1,1)$, $(5,0)$, $(4,-1)$.

$$\boxed{\frac{100}{9}}$$