Yash Khangura "Quiz" for Lecture 16 Section 24

1. Compute the Jacobian of the transformation

$\Phi(r,s) = (rs, r+s)$

$$J = \begin{vmatrix} dx/dr & dx/ds \\ dy/dr & dy/ds \end{vmatrix} = \begin{vmatrix} s & r \\ 1 & 1 \end{vmatrix} = s - r$$

2. Let $D = \Phi(R)$ where $\Phi(u,v) = (u+v, v^2)$ and $R = [0,6] \times [1,2]$. Calculate

$x = u + v$, $y = v^2$, $J = (1)(2v) - (1)(0) = 2v$

$$\iint_D y\,dA = \iint_0 v^2 \cdot 2v\,dA = \int_0^6 \int_1^2 2v^3\,dv\,du = \int_0^6 \frac{v^4}{2}\Big|_1^2 du = \int_0^6 \frac{15}{2}\,du = 45$$