427L Quiz (4/14/22)

1. Find the volume of the solid lying above the disk $D = \{(x, y) : x^2 + y^2 \le 9\}$ in $\mathbb{R}^2$, and below the surface in $\mathbb{R}^3$ with equation $z = e^{x^2 + y^2}$.

2. Use the change of coordinates $x = u$ and $y = 2u + v$ to rewrite the integral

$$\int_0^2 \int_{-1}^0 x^2 + xy^3 \, dx \, dy$$

as an integral in (u, v) coordinates. You do *not* need to evaluate the integral. (Hint: the region of integration in u, v coordinates should *not* be a rectangle. What is the right region of integration? What order of integration is easiest?)