MTH 265, Quiz #18, Summer 2024 Name _____

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Find the Jacobian for the transformation given by $x = uv, y = \frac{u}{v}$.

2. Determine the change of variables needed for the region bounded by $y = 2x - 1,\ y = 2x + 1,$ $y = 1 - x, y = 3 - x.$ Sketch the region in the plane before (xy) and after (uv).

3. Evaluate the integral $\iint_R\ xydA$ over the region R bounded by the curves $y = x, y = 3x,$ $xy = 1, xy = 3$ using the transformations $x = \sqrt{\frac{v}{u}}, y = \sqrt{uv}.$ Sketch the region before the transformation.

4. A ball is thrown eastward into the air from the origin (positive x-axis). The initial velocity is $\langle 50,0,80\rangle$, with speed measured in feet per second. The spin of the ball results in a southward acceleration of 4 ft/sec^2, so the acceleration vector is $\vec{a} = \langle 0, -4, -32\rangle$. Where does the ball land, and with what speed?