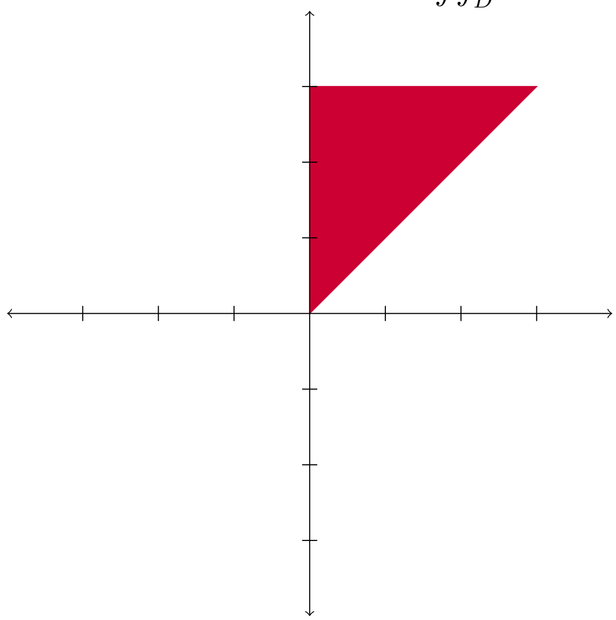
Exam 2 **Calc 3** **10/24/25**

Each problem is worth 10 points. For full credit provide good justification for your answers.

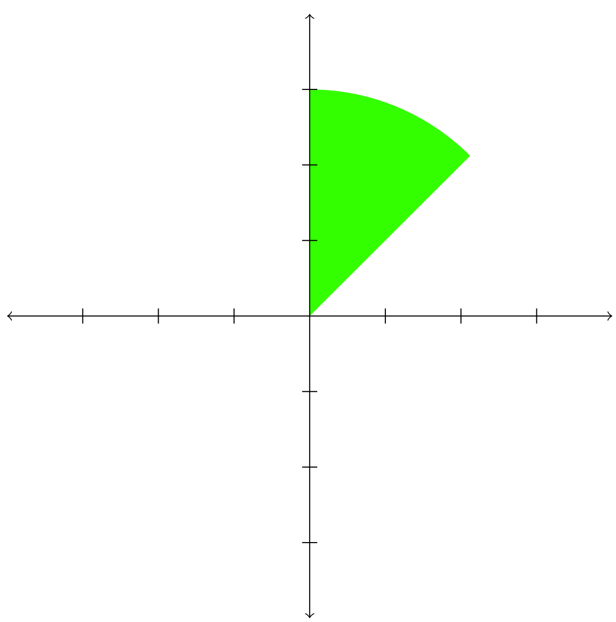
1. Write a double Riemann sum for $\iint_R f\, dA$, where $R = \{(x, y) : 0 \le x \le 6, 2 \le y \le 6\}$ using midpoints with $n = m = 2$ subdivisions

2. Set up a double integral for the integral from #1.

3. Set up limits of integration for $\iint_D f(x,y)\,dA$ over the region shown below.



4. Set up limits of integration for finding the volume under $g(x,y) = 10 - x$ within the region shown below:



5. Evaluate $\displaystyle\int_{-2}^{2}\int_{0}^{\sqrt{4-x^2}}\int_{0}^{\sqrt{4-x^2-y^2}} 3\,dz\,dy\,dx$

6. Show that the Jacobian for the conversion from rectangular to polar coordinates is what it is.

7. Muffy is a calculus student at E.S.U., and she's having trouble with multiple integrals. Muffy says "Ohmygod, I so totally failed my Calc exam. There were totally impossible problems on it, and I think it's totally bad, and my daddy is going to sue the school. There was this one that was like, you were supposed to find the region-thingy for this integral $\iiint_D 4 - x^2 - y^2 \, dV$ to be the biggest it could be, and I said, like, obviously it's bigger if you do it for a bigger regionthingy, right? So, it must be biggest if you have D be like all negative infinity to infinity, right? But I got no points, so Daddy's going to get the professor fired."

   Clarify for Muffy, in terms she can understand, how she should think about a problem like this, and what region D in fact maximizes the given integral.

8. Evaluate

$$\int_0^{\sqrt{2}} \int_0^{2-x^2} xe^{(x^2)}\, dy\, dx$$

9. Set up iterated integral(s) for the z coordinate of the centroid of the region inside a sphere with radius 3 centered at the origin but above $z = 0$ and below $z = 2$.

10. Set up iterated integral(s) for the volume of the region inside both $x^2 + z^2 = 1$ and $y^2 + z^2 = 1$.

Extra Credit (5 points possible): Set up iterated integral(s) for the volume of the region inside $x^2 + z^2 = 1$, $y^2 + z^2 = 1$, and $x^2 + y^2 = 1$.