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

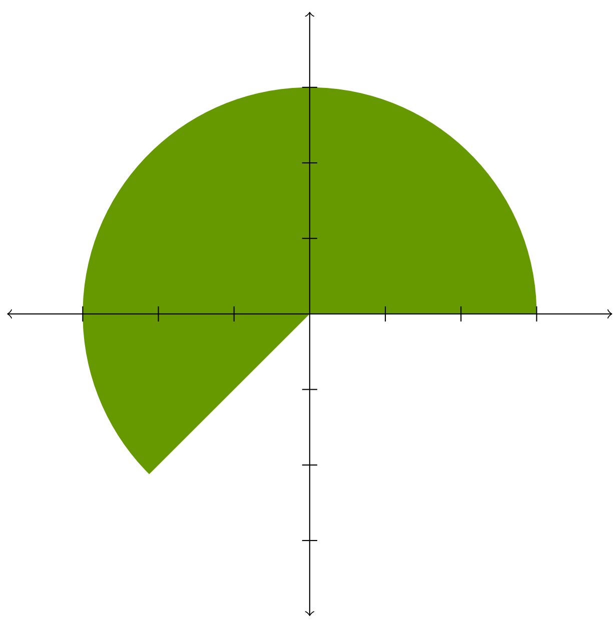
Each problem is worth 10 points. For full credit provide good justification for your answers.

1. Write a double Riemann sum for $\iint_R f\,dA$, where $R = \{(x, y) : 2 \leq x \leq 8, 0 \leq y \leq 10\}$ using midpoints with $n = m = 2$ subdivisions

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

3. Evaluate the integral $\int_0^4 \int_0^{\frac{-5x}{2}+10} 1 \, dy \, dx$

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



5. Evaluate $\int_0^4 \int_{\sqrt{y}}^2 \sqrt{x^3 + 1}\, dx\, dy$

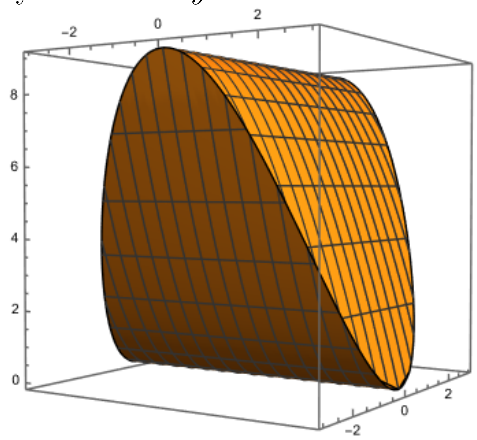
6. Show that the Jacobian for the conversion from rectangular to polar coordinates is what it is.

7. Bunny is a calculus student at Enormous State University, and she's having some trouble. Bunny says "OMG! Literally everything is impossible! I set up this one integral, like it was $\int_0^2 \int_1^{x^2} something(x, y)\, dy\, dx$, and the teacher just looked at it for a second and said it was wrong, and he didn't even know which problem I was doing, so evidently it was wrong for everything ever! Then he wouldn't even explain how he could tell it was wrong, he just said I should know! Help!"

   Help Bunny by explaining as clearly as you can why the integral she set up needs work.

8. Set up integrals for the x coordinate of the centroid of the trapezoid with vertices $(0, 0), (1, 0), (2, 1)$, and $(0, 1)$.

9. Set up an iterated integral for the volume of the region bounded between the parabolic cylinders $z = y^2$ and $z = 9 - x^2$.



10. Convert the integral $\int_{-2}^{2} \int_{0}^{\sqrt{4-x^2}} \int_{-\sqrt{4-x^2-y^2}}^{\sqrt{4-x^2-y^2}} z \, dz \, dy \, dx$ to a better coordinate system.

Extra Credit (5 points possible): Evaluate the integral from #10.