Annie's Survival Kit 2 - Math 324

1. (10 points) (a) (3 points) Draw the region of integration of $\int_{-2}^{2}\int_{-2}^{\sqrt{4-y^2}} x^2\,dx\,dy$.

   (b) (4 points) Switch the previous double integral to polar coordinates. **Do not evaluate**.

   (c) (3 points) Suppose these integrals represent the moment of inertia around the y-axis ($\int\int_R x^2\delta\,dA$) for the region you found in (a). Describe with words what the density of the region is, and describe all the ways you can move the region and still obtain the same moment of inertia.

2. (10 points) (a) (3 points) Draw the region of integration of $\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}}\int_{\sqrt{x^2+y^2}}^{1} |z|\,dz\,dy\,dx$.

   (b) (4 points) Switch the order of integration to $dx\,dy\,dz$. **Do not evaluate**.

   (c) (3 points) Suppose these integrals represent the mass ($\int\int\int_R \delta\,dV$) of the region you found in (a). Describe with words what the density of the region is, and describe all the ways you can move the region and still obtain the same mass.

3. (10 points) Find the volume between $z=\sqrt{x^2+y^2}$ and $z=x^2+y^2$ over $R: x^2+y^2\leq 1$ in two ways: with double integrals and with triple integrals.