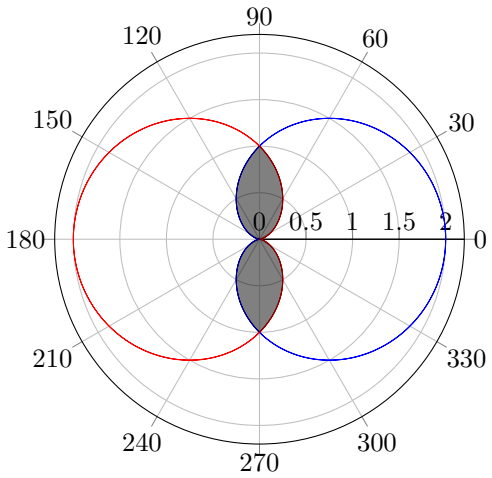
Math 2551 Worksheet Section 15.3 and 15.4

1. Sketch the region bounded by
$$y = 1 - x, \quad y = 2, \quad y = e^x$$
and find the area of of the region.

2. Change the Cartesian integral
$$\int_0^2 \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} e^{-x^2-y^2}\, dx\, dy$$
into an equivalent polar integral and evaluate the integral.

3. Use polar coordinates to find the volume of the solid above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = 1$.

4. Find the area of the region common to the interiors of the cardioids $r = 1 + \cos\theta$ and $r = 1 - \cos\theta$.



5. Let E be the part of $x^2 + y^2 + z^2 \leq 4$ when $z \geq 0$ and $y \geq 1$. Find the volume of E via polar integral.