

**Problem #7866** Use double integral to find the area of the region. The region enclosed by both of the cardioids  $r = 1 + \cos \theta$  and  $r = 1 - \cos \theta$ . Please show your work.

**Solution** From the symmetry one can get that the area equals  $4 \int_{\pi/2}^{\pi} \int_0^r r \, dr \, d\theta = 4 \int_{\pi/2}^{\pi} 0.5(1 + \cos \theta)^2 \, d\theta = 4(\pi/2 - 1)$ . The last can be obtained by standard computation.

**Answer**  $4(\pi/2 - 1)$ .