1. Sketch the regions described below. Use polar integrals to compute their areas.

   (a) The region inside the cardioid $r = 3 - 3\sin(\theta)$.

   (b) The region inside the rose $r = 5\sin(3\theta)$.

SHOW ALL WORK FOR CREDIT   GIVE EXACT ANSWERS UNLESS OTHERWISE NOTED

(c) The region bounded by the graphs of $y = -1/\sqrt{3}x$, $y = 1/\sqrt{3}x$ and $(x-2)^2 + y^2 = 4$.

(d) The region bounded by the graphs of $y = x$, $y = -x$ and $x = 5$. Confirm your answer by using geometry.

2. Consider the region inside of the cardioid $r = 1 + \cos\theta$ and outside of the circle $r = \cos\theta$.

   (a) Compute the integral
$$\frac{1}{2}\int_0^{2\pi}[(\cos\theta + 1)^2 - \cos^2\theta]d\theta.$$

   (b) Why is your result from part (a) not the area of the region described?

   (c) Find the area of the region described.