So, we must check

$$x^2 + y^2 + x/2 \stackrel{?}{=} (1/2)\sqrt{x^2+y^2} .$$

In polar coordinates this reads

$$\rho^2 + (1/2)\rho\cos\theta \stackrel{?}{=} \rho/2 \quad \Rightarrow$$

$$\rho + (1/2)\cos\theta \stackrel{?}{=} (1/2) \quad \Rightarrow$$

$$\rho \stackrel{?}{=} (1/2)(1-\cos\theta),$$ which we know is true. So the image of the circle $|\gamma| = 1$ is a cardiod. It is easy to check that the interior of this circle maps into the interior of the cardiod.

Finally, if we write $\gamma = 2 - e^{i\phi}$ for the circle on the right side of Figure 1.2.5, we get

$$\mu'' = -(\gamma-1)^2/4 = -(1/4)\left(1-e^{i\phi}\right)^2$$

$$= -(1/4)(1-e^{i\phi})^2,$$ which is the same equation as before. So, this