Math 1172 - Autumn 2015   Name: _____

Quiz 8 - In Class   Recitation Instructor: _____
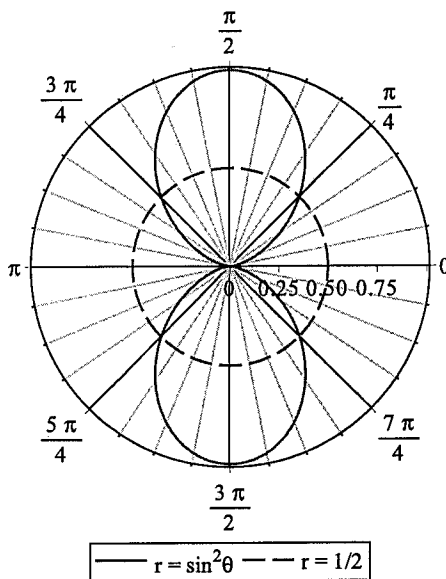
SHOW ALL WORK!!! Unsupported answers might not receive full credit.

Problem 1   [6 pts] The graphs of the polar curves $r = \sin^2\theta$ and $r = \dfrac{1}{2}$ are shown below.

$$\boxed{\text{—— } r = \sin^2\theta \quad \text{– – } r = 1/2}$$

a) [3 pts] Set up, but DO NOT EVALUATE, an integral or integrals that give the area of the region that lies between the circle $r = \dfrac{1}{2}$ and the curve $r = \sin^2\theta$.

The area in question $= 4 \cdot$ the area of the region inside the first quadrant

$$= 4 \left(\frac{1}{2} \int_0^{\frac{\pi}{4}} \left(\sin^2\theta\right)^2 - 0^2 \, d\theta + \frac{1}{2} \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \left(\tfrac{1}{2}\right)^2 - 0^2 \, d\theta \right)$$

b) [3 pts] Set up, but DO NOT EVALUATE, an integral or integrals that give the area of the region that lies outside of the circle $r = \dfrac{1}{2}$ but inside of the curve $r = \sin^2\theta$.

The area in question $= 4 \cdot$ the area of the region inside the first quadrant

$$= 4 \cdot \frac{1}{2} \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \left(\sin^2\theta\right)^2 - \left(\tfrac{1}{2}\right)^2 \, d\theta$$