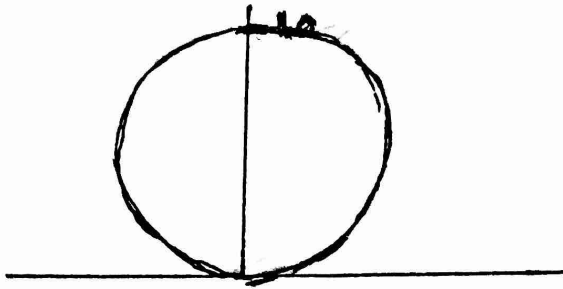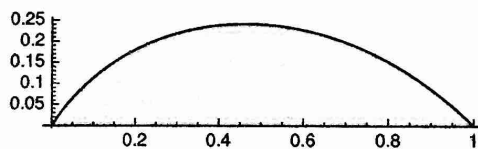_SOLUTIONS_

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MATH 19 QUIZ
29 SEPTEMBER 2016
BROWN UNIVERSITY
INSTRUCTOR: SAMUEL S. WATSON

1. Plot the polar coordinate equation $r = \sin\theta$.

2. A portion of the graph of the polar coordinate equation $r = 1 - \theta$ is shown. Find the area of the shaded region.

$$\int r \, dr \, d\theta$$

$$\Rightarrow \frac{1}{2}\int_a^b (1-\theta)^2 \, d\theta \qquad \checkmark$$

$$a = 0$$
$$b = 1$$

$$= \frac{1}{2}\int_0^1 (1-\theta)^2 \, d\theta$$

$$u = 1 - \theta$$
$$du = -d\theta$$

$$= \frac{-\int_1^0 u^2 \, du}{2}$$

$$= \int_0^1 u^2 \, du * \frac{1}{2}$$

$$= \frac{1}{3} u^3 \Big|_0^1 * \frac{1}{2}$$

$$= \frac{1}{3} * \frac{1}{2}$$

$$= \boxed{\frac{1}{6}}$$