2017 BC #2
(calculator)

(a)

Area of $R = \frac{1}{2}\int_0^{\pi/2}\left(f(\theta)\right)^2\,d\theta \approx .6484143709$ or $.648$

(b)

$$\frac{1}{2}\int_0^{k}\left[\left(g(\theta)\right)^2-\left(f(\theta)\right)^2\right]d\theta=\frac{1}{2}\int_k^{\pi/2}\left[\left(g(\theta)\right)^2-\left(f(\theta)\right)^2\right]d\theta$$

(c)

$w(\theta)=g(\theta)-f(\theta)$

$$w_A=\frac{1}{\frac{\pi}{2}-0}\int_0^{\pi/2}\left(g(\theta)-f(\theta)\right)d\theta \approx .4854461355 \text{ or } .485$$

Note: Store .4854461355 as a and use it in part (d).

(d)

We must solve for θ in $\left[0,\frac{\pi}{2}\right]$: $w(\theta)=w_A$

$g(\theta)-f(\theta)=a$ Note: a is from part (c).

$g(\theta)-f(\theta)-a=0$ Note: Solve by graphing in the function mode and find the zero in $\left[0,\frac{\pi}{2}\right]$.

$\theta=.51768795$ or $.518$ or $.517$ Note: Store .51768795 as b and use it in the next part of the problem.

$w'(b)=-.5818591$ Note: Find derivative either in function mode or polar mode.

$w(\theta)$ is **decreasing** at $\theta=b$ since $w'(b)<0$.