1. The irrational number $\pi$ is defined as the area of the unit circle.

(a) Show that $\pi = 4 \int_0^1 \sqrt{1-x^2} \, dx$.

(b) Use the result in part (a) to show that the area of the circle with radius $r$ and equation $x^2 + y^2 = r^2$ is $\pi r^2$.

3. Find the area $A$ lying between the curves $y = \sin x$ and $y = \cos x$ from $x = 0$ to $x = \frac{\pi}{2}$. 