PILOT LEARNING
CALCULUS II ENGINEERING
PROBLEM-SET 7
FALL 2019

(1) Sketch the region in the plane consisting of points whose polar coordinates satisfy the given conditions.
   (a) $0 \leq r, \ \frac{\pi}{4} \leq \theta \leq \frac{3\pi}{4}$
   (b) $2 < r < 3, \ \frac{5\pi}{3} \leq \theta \leq \frac{7\pi}{3}$
(2) Find a polar equation for the curve represented by the given Cartesian equation.
   (a) $y = 2$
   (b) $xy = 4$
   (c) $x^2 + y^2 = 2cx$
(3) Find the area of the region enclosed by one loop of the curve.
   (a) $r = 4\cos 3\theta$
   (b) $r^2 = \sin 2\theta$
(4) Find the area of the region that lies inside the first curve and outside the second curve
   (a) $r^2 = 8\cos 2\theta; \ r = 2$
   (b) $r = 3\cos\theta, \ r = 1 + \cos\theta$
(5) Find the area of the region that lies inside both curves.
   (a) $r^2 = \sin 2\theta; \ r = \cos 2\theta$
   (b) $r = 1 + \cos\theta; \ r = 1 - \cos\theta$
(6) Find the exact length of the polar curve.
   (a) $r = \cos\theta$
   (b) $r = 5^\theta; \ 0 \leq \theta \leq 2\pi$
   (c) $r = \cos^2\left(\frac{\theta}{2}\right)$