Discussion 3 Worksheet
Polar coordinates
Date: 9/1/2021

MATH 53 Multivariable Calculus

1 Computing Tangents to Polar Curves

Compute the slopes of the following curves. Find the points where the tangents are vertical and horizontal.

(a) $r = 3\cos\theta$;

(b) $r = 1 - \sin\theta$;

(c) $r = \sec\theta$;

(d) $r = e^\theta$.

2 Computing Areas

(a) Find the area of the region that lies inside $r = 3\cos\theta$ and outside $r = 1 + \cos\theta$.

(b) Find the area of the region that lies inside both curves $r = \sin 2\theta$ and $r = \cos 2\theta$.

3 Computing Arc Lengths

Using the appropriate formula, find the length of the curve.

(a) $r = 2\cos\theta$, $0 \leq \theta \leq \pi$.

(b) $r = \theta^2$, $0 \leq \theta \leq 2\pi$.

Note: These problems are taken from the worksheets for Math 53 in the Spring of 2021 with Prof. Stankova.