MAT 271 Calculus III

Homework 2

Due Feb. 13 in class.

1. Convert the following rectangular equations to polar forms.
   (a) \( x^2 + y^2 = a^2 \); (b) \( 3x - y + 2 = 0 \);

2. Convert the polar equations to rectangular equation.
   (a) \( r = 3 \); (b) \( r = \sin \theta \).

3. Find the points of horizontal and vertical tangency to the polar curve: \( r = 1 - \sin \theta \).

4. Find the arc lengths of the curves.
   (a) \( x = t^2, y = 2t, 0 \leq t \leq 2 \); (b) \( x = e^{-t} \cos t, y = e^{-t} \sin t, 0 \leq t \leq \frac{\pi}{2} \).

5. Find the surface areas of the surfaces generated by revolving the curve about the \( x \)-axis.
   (a) \( x = 4t, y = t + 1, 0 \leq t \leq 2 \); (b) \( x = a \cos^3 \theta, y = a \sin^3 \theta, 0 \leq \theta \leq \pi \).


7. Section 11.2: 27, 37, 41, 45, 65, 83.