1. [3 Points] Find parametric equations for the circle centered at the origin with radius 12, generated clockwise with initial point (0, 12). Be sure to give an interval for the parameter values. There are infinitely many correct solutions to this problem. A few of the “reasonable” or expected answers are:

\[
\begin{align*}
x &= 12 \sin t \\
y &= 12 \cos t
\end{align*}
\]

\[
\begin{align*}
x &= 12 \sin (2\pi t) \\
y &= 12 \cos (2\pi t)
\end{align*}
\]

\[
\begin{align*}
x &= -12 \cos \left( t + \frac{\pi}{2} \right) \\
y &= 12 \sin \left( t + \frac{\pi}{2} \right)
\end{align*}
\]

2. [2 Points] What are the coordinates of the foci for the following hyperbola?

\[9x^2 - y^2 = 36\]

After dividing both sides by 36, we have the equation

\[
\frac{x^2}{4} - \frac{y^2}{36} = 1
\]

which is in standard form, \( \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \).

According to the boxes on pages 765 and 767, the hyperbola has foci at \((\pm c, 0)\), where \( c^2 = a^2 + b^2 = 4 + 36 = 40 \). So \( c = 2\sqrt{10} \), and the foci are \((\pm 2\sqrt{10}, 0)\).
3. [5 Points] Set up the integral to find the area of the region inside the curve \( r = 1 + \cos(\theta) \) and outside the circle \( r = 1 \).

\[
1 + \cos \theta = 1 \quad \Rightarrow \quad \theta = -\frac{\pi}{2} \quad \text{and} \quad \frac{\pi}{2}.
\]

\[
A = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{2} \left( (1 + \cos \theta)^2 - 1^2 \right) d\theta
\]

Due to symmetry about the \( x \)-axis, we can also use

\[
A = 2 \cdot \int_{0}^{\frac{\pi}{2}} \frac{1}{2} \left( (1 + \cos \theta)^2 - 1^2 \right) d\theta
\]