Prob. 1
(a) Draw the graph of the polar curve \( r = 1 - \cos \theta \)
(b) Calculate its entire arc length
(c) Find the slope of the tangent line to the polar curve \( r = \cos 3\theta \) at \( \theta = 3\pi/4 \)
Prob. 2
Find the area of the region inside the polar curve $r = 2 + 2 \cos \theta$ and to the right of the polar curve $r \cos \theta = 3/2$. Draw the graphs of these curves.
Prob. 3
Express the vectors $\vec{v} = (-2, 1, 6)$ as the sum of a vector parallel to $\vec{b} = (0, -2, 1)$ and a vector orthogonal to $\vec{b}$
Prob. 4
Use a scalar triple product to determine whether the vectors $\vec{u} = (4, -8, 1)$, $\vec{v} = (2, 1, -2)$ and $\vec{w} = (3, -4, 12)$ lie in the same plane.
Prob. 5

(a) Find parametric equations of the line \( L \) through the points \( P(2, 4, -1) \) and \( Q(5, 0, 7) \).

(b) Where does the line intersect the \( XY \)-Plane.

(c) Find the parametric equation of the line that is tangent to the parabola \( y = x^2 \) at \((-2, 4)\).
Prob. 6
(a) Find the angle that the vector \(-\sqrt{3}i + j\) makes with the positive y-axis
(b) Let \(\vec{u} = (1, -2, 2), \vec{v} = (2, 0, 4)\). Find all values of \(x\) so that the vector \(\vec{w} = (x, -3, x^2)\) is orthogonal to the vector \(\vec{v} - \vec{u}\)