Q1. Let $r = \cos(\theta)$. (1) Draw a sketch of $r(\theta)$ showing points of interest on the curve.
(2) Find the equation of the tangent line at $\theta = \pi/4$.

Q2. (1) Find the length of the curve,
$$x = e^t + e^{-t}, \quad y = 5 - 2t, \quad 0 \leq t \leq 3.$$
(2) Find the area enclosed by the $x$-axis and the curve $x = 1 + e^t, \quad y = t - t^2$.

Q3. (1) Find the common (overlapping) area between the curve $r = \frac{1}{2}$ and one leaf of $r = \cos(3\theta)$.
(2) Write down the integral for the length of the boundary of one leaf of the curve $r = \cos 3\theta$. (But do not evaluate the integral.)