1. Tangents, Arclengths an Polar Coordinates

The spiral is graphed out by the parametric equation

$$x(t) = t \cos t$$
 $y(t) = t \sin t$

where $t \ge 0$

(1) What is equation for the line which touches the point on the curve $(0, \pi/2)$?

(2) Write down an integral which computes the length of a spiral from t = 0 to $t = 2\pi$.

(3) The Limacon is graphed by the polar equation

$$r = 1 + c\sin\theta$$

- What shape is this graph when c = 0?
- Sketch a graph of this when c = 1.
- What is the graph of $r = \cos(\theta)$ look like?

 \bullet Describe how the Limacon changes as c goes to infinity.