Please write solutions to these problems on separate sheet(s) of paper (i.e. don’t print and write on this assignment.)

1. Find a parametric form for the line segment from the point \((a, b)\) to the point \((c, d)\), where \(t\) ranges over the interval \([0, 1]\). (HINT: set up \(x(t)\) and \(y(t)\) as linear functions. You should know what \(x(0)\), \(x(1)\), \(y(0)\), \(y(1)\) are, and this is enough info to find \(x(t)\) and \(y(t)\))!

2. The parametric curve \(x = \cos^4 t\), \(y = \sin^4 t\), \(t \in [0, \pi/2]\), looks like the following:

\[
\begin{array}{c}
\includegraphics[width=0.3\textwidth]{parametric_curve.png}
\end{array}
\]

Find the area inside this curve and the first quadrant (i.e. the area between the curve and the x- and y-axes).

3. (a) Sketch the parametric curve \(x = e^t \cos t\), \(y = e^t \sin t\), \(t \in [0, 2\pi]\). (HINT: this looks kind of like a circle, but we multiply \(x\) and \(y\) by \(e^t\). Think about what \(e^t\) does as \(t\) ranges from 0 to \(2\pi\), and think about how that multiplication changes the graph of a circle to yield this graph.)

(b) Find the length of this curve.