MTH201: EXTRA PROBLEMS FOR WEEKS 2 AND 3

(1) Let $\vec{w}_1$ and $\vec{w}_2$ be two non parallel vectors in $\mathbb{R}^2$. Conside rthe curve C in $\mathbb{R}^2$ that consists of all vectors of the form $\cos(t)w_1 + \sin(t)w_2$ where t is a parameter.
a) Show that C is an ellipse.
b) If $T : \mathbb{R}^2 \to \mathbb{R}^2$ is an invertible linear transformation, and C is as above, show that $T(C)$ is also an ellipse.

(2) Do the even numbered T/F problems of Assignment 3, starting from 26-50. Skip the ones on transition matrices.

(3) Let u and v be a nonzero vector in $\mathbb{R}^n$ and $\mathbb{R}^m$ respectively . Find the rank of the linear transformation $T : \mathbb{R}^m \to \mathbb{R}^n$ with matrix uv^t.