Lecture 30 Problems

Problem 1

(a): Yes.

(b): $T\begin{pmatrix}x\\y\end{pmatrix} = 2\begin{bmatrix}x\\y\end{bmatrix}$, and we can verify by noting that

$\left|\begin{bmatrix}x\\y\end{bmatrix}\right| = \sqrt{x^2+y^2}$, while

$|T(x,y)| = \sqrt{4(x^2+y^2)} = 2\sqrt{x^2+y^2}$, thus it doubles length as expected.

(c): Just multiply x and y by 2;

$$T = 2I = \begin{bmatrix}2 & 0\\ 0 & 2\end{bmatrix}.$$

Problem 2

Simple:

$$T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} y^2 \\ x^2 \end{bmatrix}$$