1) Find a basis for $\mathcal{L}(R^2, R^3)$, the space of all linear transformations from R^2 to R^3.

2) Let V and W be two vector spaces.

Recall $\mathcal{L}(V, W)$ is the set containing all linear transformations from V to W

Let $v \neq 0$ $v \in V$, and $S = \{T : V \to W \mid T(v) = 0\}$

Prove that S is a subspace of $\mathcal{L}(V, W)$

if $\dim V = n$ and $\dim W = m$, what is $\dim(S)$?

3) Is T $M_{2\times 2}(R) \to P_2(R)$ defined by

$$T\begin{pmatrix} a & b \\ c & d \end{pmatrix} = a + 2bx + (c+d)x^2$$

invertible? If so find its inverse T^{-1}, that is find a formula

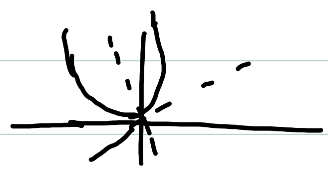
$$T^{-1}\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} ? & ? \\ ? & ? \end{pmatrix}$$

4) is T $M_{2\times 2} \to M_{2\times 2}$ defined by

$$T\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} a+b & a \\ c & c+d \end{pmatrix}$$ invertible? If so find its inverse T^{-1}, that is find a formula

$$T^{-1}\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} ? & ? \\ ? & ? \end{pmatrix}$$

5) Find the equation (in the x y plane) of the curve you get by rotating the parabola $y=x^2$ counterclockwise of an angle of $\pi/6$ rad.



6) Give an example of a linear Transformation $T\ V \to V$ that is one to one but not invertible.

7) Give an example of a linear transformation $T\ V \to V$ that is onto but not invertible.

8) $B_1=\{1, x, x^2\}$ and $B_2\ \{2x^2-x, 3x^2+1, x^2\}$ are two bases for $P_2(\mathbb{R})$. Find the matrices $I_{B_1}^{B_2}$, of change of basis from B_1 to B_2 and $I_{B_2}^{B_1}$ of change of basis from B_2 to B_1