Solutions for Test 3

Problem 1

a)

$$\begin{bmatrix} 4 \\ 9 \\ 1 \end{bmatrix}$$

b)

$$\begin{bmatrix} 3 \\ 2 \end{bmatrix}$$

c)

$$\begin{bmatrix} -6 \\ -2 \end{bmatrix}$$

d) The vectors are perpendicular.
e) The first is not linear, the second is.

Problem 2

a) $x = 3/2$, $y = 5/2$, $z = 2$, precisely one solution.
b) $x = 3/2$, $y = 1/2 + z$, z is arbitrary. Infinitely many solutions.
c) No solution.

Problem 3

The matrix associated with T_1 is

$$M_1 = \begin{bmatrix} 5 & 3 \\ -1 & 2 \end{bmatrix}$$

and the one for T_2 is given by

$$M_2 = \begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix} .$$

Finally the matrix associated with $T_1 \leq T_2$ is given by

$$M_1 M_2 = \begin{bmatrix} 9 & -2 \\ -7 & 3 \end{bmatrix} .$$

Problem 4

a)

$$\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

b) $1/3$
c) $1/\sqrt{2}$.