HW 4 Fernando Correa

4) $x \to Ax + b$ A is invertable matrix

Additivity: $T(u+v) = T(u) + T(v)$

verify these properties with $T(x) = Ax + b$

additivity: $T(u+v) = A(u+v) + b = A(u) + A(v) + b$

$T(u) + T(v) = (Au+b) + (Av+b) = Au + Av + 2b$

$Au + Av + b \neq Au + Av + 2b$ when $b \neq 0$ bc left has 1 b and right has 2 b

5) $T(x_1, x_2, x_3) = (x_1 + 2x_3, -x_1 + 4x_2, x_1 + 6x_2,$
$x_1 - x_2 - x_3)$

$$x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \qquad T(x) = \begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \end{bmatrix}$$

$y_1 = x_1 + 2x_3$
$y_2 = -x_1 + 4x_2$
$y_3 = x_1 + 6x_2$
$y_4 = x_1 - x_2 - x_3$

$$\begin{bmatrix} 1 & 0 & 2 \\ -1 & 4 & 0 \\ 1 & 6 & 0 \\ 1 & -1 & -1 \end{bmatrix}$$

10) $x_1 = (1,1)$ $x_2 = (4,3)$ $x_3 = (5,0)$

$d =$ $x = 1$ $y' = \frac{y}{x}$, $x' = 1$ $y' = \frac{y}{x}$

$$P = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix}$$

$$\downarrow$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \quad (x', y') = \left(1, \frac{y}{x}\right)$$

$x_1 = (1,1) \rightarrow x_1' = \left(1, \frac{1}{1}\right) = (1,1)$

$x_2 = (4,3) \rightarrow x_2' = \left(1, \frac{3}{4}\right) = (1, .75)$

$x_3 = (5,0) \rightarrow x_3' = \left(1, \frac{0}{5}\right) = (1,0)$