

Homework 4: Due March 1st (Friday)

- (1) Row reduce the following matrices to row reduce echelon form. (Make sure you specify your row operations.)

(a)

$$\begin{bmatrix} 3 & 5 & 6 & 1 & 0 \\ 2 & 11 & 11 & 5 & 0 \\ 3 & 10 & 20 & 5 & 0 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 1 & 4 & 2 & 1 & 0 & 0 \\ 2 & 7 & 3 & 0 & 1 & 0 \\ -3 & 10 & -5 & 0 & 0 & 1 \end{bmatrix}$$

- (2) Find the point  $(a, b, c, d)$  in  $\mathbb{R}^4$  such that  $a, b, c$  and  $d$  satisfy

$$2a + 3b + 4c + 4d = 2$$

$$3a + 2b + 4c + 2d = 3$$

$$4a + 3b + 2c + 3d = 4$$

and it is closest to the origin. (Hint: The solution to the above system is a line, so the problem can be reduced to projecting a point onto a line.)

- (3) Find  $x$  so that the vector  $[x \ 9 \ -14 \ 4]$  is a linear combination of the vectors

$$\begin{bmatrix} -2 \\ 1 \\ -\frac{1}{2} \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \\ 3 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ -1 \\ 2 \end{bmatrix}$$