

# Homework #6

Math 2010  
Due April 7

1. Let

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

with respect to the standard basis in  $\mathfrak{R}^2$ . Find  $[x]_{B'}$  where  $B' = \{[2, -4], [3, 8]\}$ .

2. Let

$$x = \begin{bmatrix} a \\ b \end{bmatrix}$$

with respect to the standard basis in  $\mathfrak{R}^2$ . Find  $[x]_{B'}$  where  $B' = \{[1, 1], [0, 2]\}$ .

3. Let

$$p(x) = 2 - x + x^2.$$

Then the coordinate vector of  $p$  with respect to the standard basis  $\{1, x, x^2\}$  in  $P_2$  is given by

$$[p] = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}.$$

Find the coordinate vector with respect to the the basis  $B' = \{1 + x, 1 + x^2, x + x^2\}$

4. Let

$$[x]_B = \begin{bmatrix} 6 \\ -1 \\ 4 \end{bmatrix}$$

where  $B = \{[1, 0, 0], [2, 2, 0], [3, 3, 3]\}$ . Find  $[x]_{B'}$  where  $B'$  is the standard basis.

5. Consider

$$B = \{[2, 2], [4, -1]\}$$

and

$$B' = \{[1, 3], [-1, -1]\}$$

(a) Assume

$$x = \begin{bmatrix} 3 \\ -5 \end{bmatrix}$$

with respect to the standard basis. Compute  $[x]_B$  with respect to basis  $B$ .

(b) Find the transition matrix from  $B$  to  $B'$ .

(c) Use the transition matrix to find  $[x]_{B'}$  given  $[x]_B$  from part (a).

(d) Check your work by computing  $[x]_{B'}$  directly from the coordinate vector  $x$  with respect to the standard basis.