Math 322 Sect. 2
Homework #11
Due Wed. 4/8/15
klin@math.arizona.edu

Please write these up and turn them in.

1. Consider the matrix

$$A = \begin{bmatrix} -1 & 8 & 4 \\ -2 & 7 & -3 \\ -2 & -11 & 1 \end{bmatrix}. \tag{1}$$

   (a) Show that the columns of A form a basis of $\mathbb{R}^3$.

   (b) Let

$$x = \begin{bmatrix} 1 \\ 3 \\ 7 \end{bmatrix}. \tag{2}$$

   Find the coordinates of x relative to the basis in (a) by solving a linear system of equations. (You do *not* need to simplify your answer.)

   (c) Show that the columns of A actually form an orthogonal basis of $\mathbb{R}^3$. Using this fact, calculate the coordinates of x again, by using inner products.

2. Let

$$A = \begin{bmatrix} 1 - 2i & -3 + 4i \\ 3 + 4i & 1 + 2i \end{bmatrix}. \tag{3}$$

   (a) Show that the columns of A form an orthogonal basis for $\mathbb{C}^2$.

   (b) Find the coordinates of

$$x = \begin{bmatrix} 1 \\ i \end{bmatrix} \tag{4}$$

   relative to A.