Economics 312 **Spring 2013**
Daily Problem #4 **February 6**

Today's problem paves the way for us to analyze the linear regression model using matrices and vectors. Suppose that we have N observations indexed by $i = 1, 2, \ldots, N$. For each observation, $y_i = \beta_1 + \beta_2 x_i + e_i$. Thus, we have a set of N equations corresponding to the values of i. Show that each of these equations corresponds to one row of the matrix equation: $\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \mathbf{e}$, where

$$\mathbf{y} = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix}, \quad \mathbf{X} = \begin{bmatrix} 1 & x_1 \\ 1 & x_2 \\ \vdots & \vdots \\ 1 & x_N \end{bmatrix}, \quad \boldsymbol{\beta} = \begin{bmatrix} \beta_1 \\ \beta_2 \end{bmatrix}, \quad \mathbf{e} = \begin{bmatrix} e_1 \\ e_2 \\ \vdots \\ e_N \end{bmatrix}.$$