Lab 12

Stat 427

Fall 2020

Instructions

Complete all questions. To prepare for the randomly collected lab, follow the instructions on the class website to prepare the work for submission. These submission rules will apply to all labs throughout the semester.

Systems of linear equations

(1) Calculate the inverses of the following matrices

  (a)

$$\mathbf{A} = \begin{bmatrix} -0.8 & 3.9 \\ -3.4 & 9.1 \end{bmatrix}$$

  (b)

$$\mathbf{B} = \begin{bmatrix} -0.02 & -4.7 & 4.9 \\ -6.6 & -2.7 & 0.7 \\ 3.9 & -0.8 & -3.7 \end{bmatrix}$$

  (c)

$$\mathbf{C} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 10 & 7.9 & -12.6 & 2.7 \end{bmatrix}$$

  (d)

$$\mathbf{A} = \begin{bmatrix} 1 & 10 \\ 1 & 7.9 \\ 1 & -12.6 \\ 1 & 2.7 \end{bmatrix}$$

(2) Solve the systems of linear equtions of the form $\mathbf{Ax} = \mathbf{c}$ for the vector of unkowns, corresponding to the following $\mathbf{A}$ and $\mathbf{c}$ matrices.

  (a)

$$\begin{bmatrix} 14.5 & 5.6 & -5.1 \\ 10.2 & -8.7 & -3.5 \\ 7.5 & 10.0 & 2.2 \end{bmatrix} , \begin{bmatrix} 17.9 \\ 10.4 \\ -3.8 \end{bmatrix}$$

  (b)

$$\begin{bmatrix} 3.6 & -7.5 & 3 & -6.9 \\ -13.3 & 8.2 & -6.7 & 17.1 \\ 0.7 & -12.7 & -2.4 & 17.8 \\ -3.2 & 25.9 & -17.9 & -11.4 \end{bmatrix} , \begin{bmatrix} 6.1 \\ 1.1 \\ 4.6 \\ 6.7 \end{bmatrix}$$

(3) Using the `Olympic1500` dataset (from earlier), design a linear prediction equation for the trend of the winning times through the years. Does the trend in recent years look like it is continuing according to the linear model, or changing? Predict a winning time for the winning time in 2012, obtain the real winning time with some reasearch and compare it to the prediction.

1900	1904	1936	1948	1960	1968	1972	1976
246.0	241.9	227.8	229.8	218.4	214.9	216.3	216.3
1980	**1984**	**1988**	**1992**	**1996**	**2000**	**2004**	**2008**
218.4	212.5	16.0	220.1	215.8	212.1	214.2	212.9