

ETC2410 Assignment 2

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Question 2 (31 Marks)

2(a)

$$\begin{aligned} \widehat{HOUSTNSA} = & \underset{(4.196)}{92.871} - \underset{(5.911)}{4.592} Jan - \underset{(5.911)}{1.935} Feb + \underset{(5.934)}{26.184} Mar \\ & + \underset{(5.934)}{41.452} Apr + \underset{(5.934)}{46.786} May + \underset{(5.934)}{46.263} Jun + \underset{(5.934)}{40.937} Jul \\ & + \underset{(5.934)}{38.714} Aug + \underset{(5.934)}{32.252} Sep + \underset{(5.934)}{36.170} Oct + \underset{(5.934)}{15.600} Nov \end{aligned} \quad (1)$$

2(b)

Steps

In order to formulate the linear regression, first we need to determine the intercept: From equation 1 we can determine the values of each month because of the dummy variables. $92.871 - 4.592 = c \rightarrow c = 88.280$, where the LHS is the month of Jan from calculated from equation 1.

Next we need to determine the β values for Feb - Dec. Since we know the intercept for the

new equation, we can substitute it in.

$$\begin{aligned} 92.871 + 1.935 &= 88.280 + \beta_2 \text{ Feb} \\ \rightarrow \beta_2 &= 2.656 \end{aligned}$$

$$\begin{aligned} 92.871 + 26.184 &= 88.280 + \beta_3 \text{ Mar} \\ \rightarrow \beta_3 &= 30.776 \end{aligned}$$

$$\begin{aligned} 92.871 + 41.452 &= 88.280 + \beta_4 \text{ Apr} \\ \rightarrow \beta_4 &= 46.044 \end{aligned}$$

$$\begin{aligned} 92.871 + 46.786 &= 88.280 + \beta_5 \text{ May} \\ \rightarrow \beta_5 &= 51.377 \end{aligned}$$

$$\begin{aligned} 92.871 + 46.263 &= 88.280 + \beta_6 \text{ Jun} \\ \rightarrow \beta_6 &= 50.855 \end{aligned}$$

$$\begin{aligned} 92.871 + 40.937 &= 88.280 + \beta_7 \text{ Jul} \\ \rightarrow \beta_7 &= 45.528 \end{aligned}$$

$$\begin{aligned} 92.871 + 38.714 &= 88.280 + \beta_8 \text{ Aug} \\ \rightarrow \beta_8 &= 43.306 \end{aligned}$$

$$\begin{aligned} 92.871 + 32.252 &= 88.280 + \beta_9 \text{ Sep} \\ \rightarrow \beta_9 &= 36.844 \end{aligned}$$

$$\begin{aligned} 92.871 + 36.170 &= 88.280 + \beta_{10} \text{ Oct} \\ \rightarrow \beta_{10} &= 40.762 \end{aligned}$$

$$\begin{aligned} 92.871 + 15.600 &= 88.280 + \beta_{11} \text{ Nov} \\ \rightarrow \beta_{11} &= 20.192 \end{aligned}$$

$$\begin{aligned} 92.871 &= 88.280 + \beta_{12} \text{ Dec} \\ \rightarrow \beta_{12} &= 4.592 \end{aligned}$$

$$\begin{aligned} \widehat{HOUSTNSA} = & 88.280 + 2.656 \text{ Feb} + 30.776 \text{ Mar} + 46.044 \text{ Apr} \\ & + 51.377 \text{ May} + 50.855 \text{ Jun} + 45.528 \text{ Jul} + 43.306 \text{ Aug} \\ & + 36.844 \text{ Sep} + 40.762 \text{ Oct} + 20.192 \text{ Nov} + 4.592 \text{ Dec} \end{aligned} \quad (2)$$

2(c)

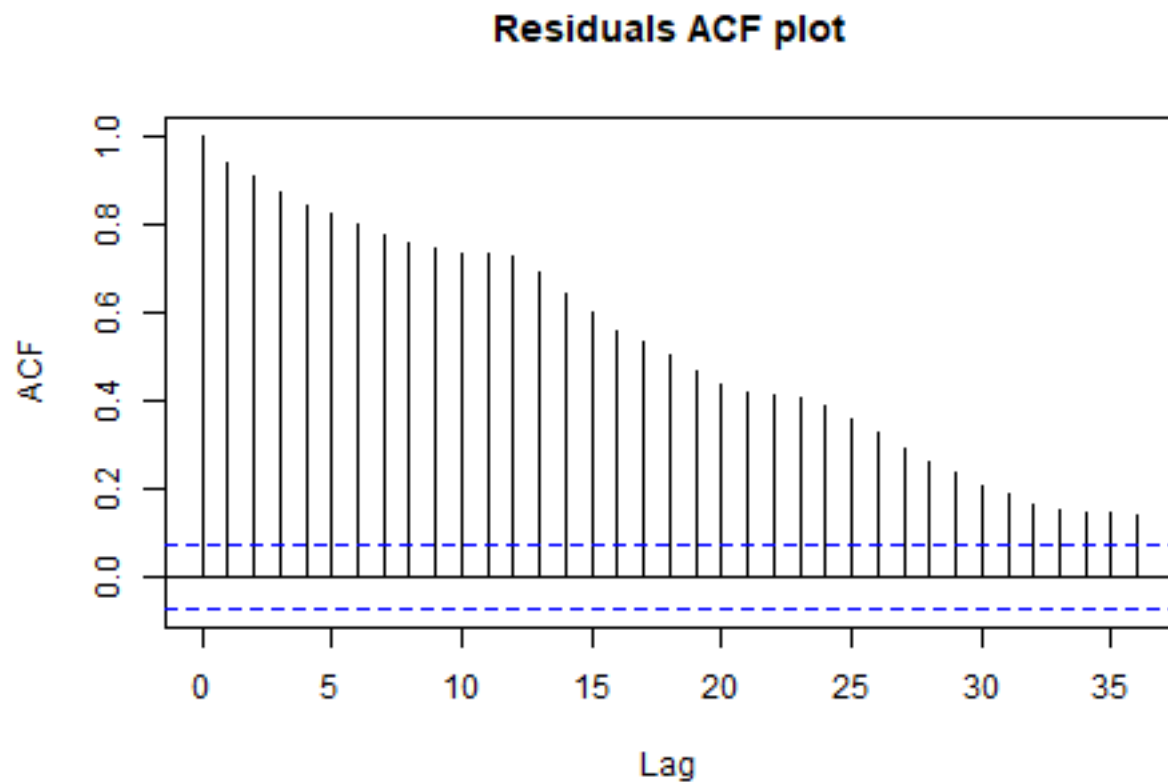
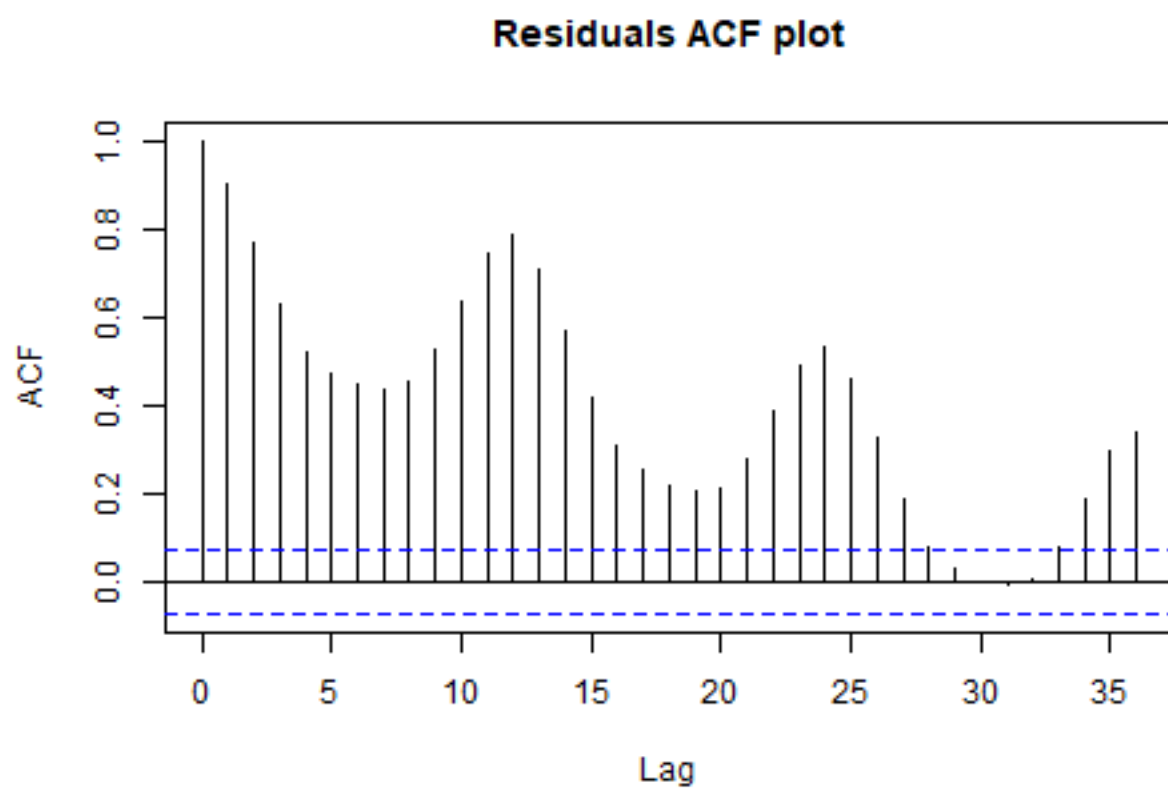


Figure 1: A Residual ACF plot for the linear model $HOUSTNSA \sim c + \text{Jan} + \text{Feb} + \text{Mar} + \text{Apr} + \text{May} + \text{Jun} + \text{Jul} + \text{Aug} + \text{Sep} + \text{Oct} + \text{Nov}$



2(d)

2(e)