

# ETC2410 Assignment 2

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## Question 2 (31 Marks)

2(a)

$$\widehat{HOUSTNSA} = 92.871 - 4.592 \underset{(4.196)}{Jan} - 1.935 \underset{(5.911)}{Feb} + 26.184 \underset{(5.934)}{Mar} \\ + 41.452 \underset{(5.934)}{Apr} + 46.786 \underset{(5.934)}{May} + 46.263 \underset{(5.934)}{Jun} + 40.937 \underset{(5.934)}{Jul} \\ + 38.714 \underset{(5.934)}{Aug} + 32.252 \underset{(5.934)}{Sep} + 36.170 \underset{(5.934)}{Oct} + 15.600 \underset{(5.934)}{Nov}$$
 (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  $\beta$  values for Feb - Dec. Since we know the intercept for the

new equation, we can substitute it in.

$$92.871 + 1.935 = 88.280 + \beta_2 \text{ } Feb$$

$$\rightarrow \beta_2 = 2.656$$

$$92.871 + 26.184 = 88.280 + \beta_3 \text{ } Mar$$

$$\rightarrow \beta_3 = 30.776$$

$$92.871 + 41.452 = 88.280 + \beta_4 \text{ } Apr$$

$$\rightarrow \beta_4 = 46.044$$

$$92.871 + 46.786 = 88.280 + \beta_5 \text{ } May$$

$$\rightarrow \beta_5 = 51.377$$

$$92.871 + 46.263 = 88.280 + \beta_6 \text{ } Jun$$

$$\rightarrow \beta_6 = 50.855$$

$$92.871 + 40.937 = 88.280 + \beta_7 \text{ } Jul$$

$$\rightarrow \beta_7 = 45.528$$

$$92.871 + 38.714 = 88.280 + \beta_8 \text{ } Aug$$

$$\rightarrow \beta_8 = 43.306$$

$$92.871 + 32.252 = 88.280 + \beta_9 \text{ } Sep$$

$$\rightarrow \beta_9 = 36.844$$

$$92.871 + 36.170 = 88.280 + \beta_{10} \text{ } Oct$$

$$\rightarrow \beta_{10} = 40.762$$

$$92.871 + 15.600 = 88.280 + \beta_{11} \text{ } Nov$$

$$\rightarrow \beta_{11} = 20.192$$

$$92.871 = 88.280 + \beta_{12} \text{ } Dec$$

$$\rightarrow \beta_{12} = 4.592$$

$$\widehat{HOUSTNSA} = 88.280 + 2.656 \text{ Feb} + 30.776 \text{ Mar} + 46.044 \text{ Apr} \quad (2)$$

$$+ 51.377 \text{ May} + 50.855 \text{ Jun} + 45.528 \text{ Jul} + 43.306 \text{ Aug}$$

$$+ 36.844 \text{ Sep} + 40.762 \text{ Oct} + 20.192 \text{ Nov} + 4.592 \text{ Dec}$$

2(c)

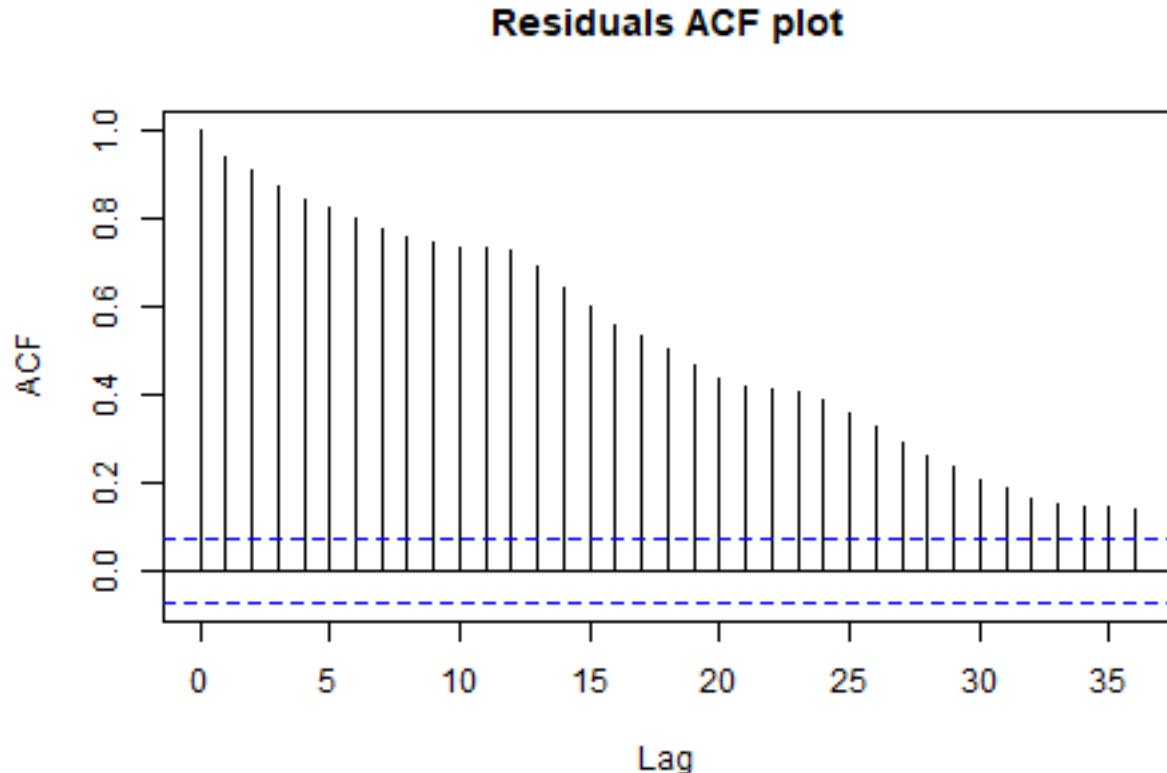
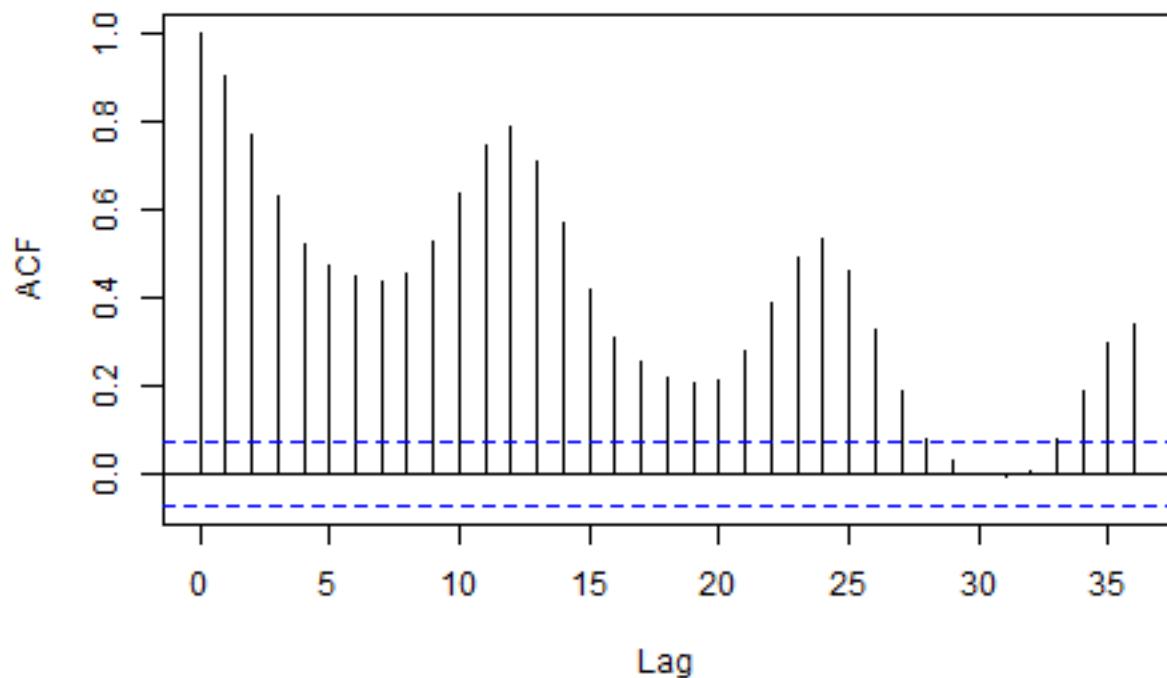


Figure 1: A Residual ACF plot for the linear model  $HOUSTNSA \sim c + \text{Jan} + \text{Feb} + \text{Mar} + \text{Apr} + \text{May} + \text{Jun} + \text{Jul} + \text{Aug} + \text{Sep} + \text{Oct} + \text{Nov}$

### Residuals ACF plot



2(d)

2(e)