

# STT3851 Homework 7

Dr. Hasthika Rupasinghe

Due – March 09

Load the `Carseats` data set from the ISLR library. Be sure to explore this data set before answering the questions below. When exploring, the R commands such as `?Carseats`, `str()`, `head()` might be helpful. Consider fitting a simple linear regression to predict the `Sales` using `Age`.

1. Obtain  $\sum y_i$ ,  $\sum x_i$ ,  $\sum x_i^2$ ,  $\sum x_i y_i$ ,  $\sum y_i^2$ ,  $n$  and  $\sum e_i^2$  using R.
2. Use the following four steps to check whether there is a linear relationship to exist between ‘Age’ and ‘Sales’:
  - (a) State the null and alternative hypothesis:
  - (b) Calculate the t test statistic using the quantities you computed above (Hint: First find  $\hat{\beta}_1$  and MSE. Secondly find  $SE(\hat{\beta}_1)$ )
  - (c) Find the  $p$ -value using R. (I did not provide a command to do this in class.)
  - (d) Make the decision:
3. Use the ‘`lm()`’ function along with the ‘`summary()`’ function to repeat the 4-step hypothesis test above
  - (a) State the null and alternative hypothesis
  - (b) Get the t test statistic from the output
  - (c) Get the  $p$ -value from the output
  - (d) Make the decision