Examination #1
Sonoma State University
Economics 317-Introduction to Econometrics

Dr. Cuellar
Spring 2018

Answer all questions completely.  Absolutely no colluding with classmates on the examination.  Any answers deemed suspiciously similar will be given a zero and those found suspected of colluding on the examination will be prosecuted to the fullest.  Copy and paste the following on your examination and sign.

“On my honor, I swear that I have neither given nor received help on this examination.”

Name___________________________

Examinations without a signed statement will not be accepted.  Your typed answers are due at the beginning of class on Tuesday, February 27, 2018.  Late examinations will not be accepted.

The data set Econ317_Exam1.dta contains data on the price per one way ticket (fare) and number of passengers (passengers) for a sample of major airports.  We want to examine only those flights that leave from (i.e., who’s origin is) Baltimore, Maryland.

Summary Statistics
(a) Show graphically the distribution of airfares.  Describe.
(b) What is the average airfare of flights leaving Baltimore?
(c) What are the lowest and highest fares of flights leaving Baltimore?
(d) Show graphically the distribution of passengers leaving Baltimore?
(e) What is the average number of passengers leaving Baltimore?
(f) What are the lowest and highest numbers of passengers leaving Baltimore in a day?

The Law of Demand
(g) Show a scatter diagram illustrating the relationship between airfare and passengers per day for flights leaving Baltimore.  Describe your graph.  Is your graph consistent with your theoretical expectations?  Explain.
(h) Set up a model for a simple linear demand function for passengers leaving from Baltimore.  Interpret each variable in model and discuss the expected sign.
(i) Provide an ordinary least squares estimate of the linear demand function specified above.  Show your regression results.
(j) Show graphically your estimated linear demand function with a scatter diagram of the data.  Describe your graph.  How well does the model appear to fit the data?

Interpreting the demand equation.  Based on your estimated demand equation:
(k) At what airfare does the number of passengers go to zero?  Explain.
(l) If airfare were set to zero, how many passengers would leave of Baltimore?  Explain.
(m) Given your linear demand function, what would the total revenue function look like?

Testing the model
(n) State and interpret the R².
(o) Perform an F-test on the overall significance of the model.  Explain fully and show graphically.  Be sure to clearly state and interpret the null and alternative hypothesis.
Testing the coefficients
(p) Formally set up a test of significance for the $\beta_1$ coefficient using a 5% level of significance. Be sure to state the null and alternative hypothesis and explain each. Should it be a one sided or two sided test? Explain fully and show graphically.
(q) Calculate the critical $\beta_1^*$ coefficient[s]. Interpret and show graphically.
(r) Compare the sample $\hat{\beta}_1$ coefficient with the critical $\beta_1^*$. Interpret your results.
(s) What is[are] your critical t-statistic[s] for $\beta_1$? Interpret the value[s].
(t) Compare the sample t-statistic[s] with the critical t. Interpret your results.
(u) What is the p-value of your estimated $\beta_1$ coefficient? Interpret.
(v) Construct a 95% confidence interval on your estimated $\hat{\beta}_1$ coefficient. Explain fully and show graphically.

Suppose that prior research showed that for every $1 increase in airfare, five fewer passengers fly out of Baltimore.
(w) Set up a hypothesis test to test if your results are statistically different from the prior estimate? Explain fully and show graphically. Use a 5% level of significance.

Forecasting
Suppose that Baltimore is attempting to raise revenue and is considering different pricing structures for outbound flights: A low price strategy and a high price strategy.
(x) Suppose that Baltimore wants to set the airfare at a low price of $25. What is the expected number of outbound passengers for a mean prediction?
(y) At an airfare of $25, what is the margin of error for the mean prediction using a 5% level of confidence?
(z) At an airfare of $25, what is the 95% confidence interval on the mean prediction?
(aa) What is the associated 95% confidence interval on revenue?
(bb) Suppose that Baltimore wants to set the airfare at a high price of $400. What is the expected number of outbound passengers for a mean prediction?
(cc) At an airfare of $400, what is the margin of error for the mean prediction using a 5% level of confidence?
(dd) At an airfare of $400, what is the 95% confidence interval on the mean prediction?
(ee) Show graphically the estimated linear demand with the confidence interval on the mean predictions.
(ff) What is the associated 95% confidence interval on revenue?
(gg) Construct a table showing the airfare, expected number of passengers, margin of error and lower and upper confidence intervals for following airfares: $25 and $400. Your table should be set up follows,

<table>
<thead>
<tr>
<th>Airfare</th>
<th>Expected Passengers</th>
<th>Margin of Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Lower Bound Estimated Revenue</th>
<th>Upper Bound Estimated Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>$25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(hh) Suppose that Baltimore wants to set the airfare at a low price of $25. What is the expected number of outbound passengers for an individual prediction?
(ii) At an airfare of $25, what is the margin of error for the individual prediction using a 5% level of confidence?

(jj) At an airfare of $25, what is the 95% confidence interval on the individual prediction?

(kk) What is the associated 95% confidence interval on revenue?

(ll) Suppose that Baltimore wants to set the airfare at a high price of $400. What is the expected number of outbound passengers for an individual prediction?

(mm) At an airfare of $400, what is the margin of error for the individual prediction using a 5% level of confidence?

(nn) At an airfare of $400, what is the 95% confidence interval on the individual prediction?

(oo) What is the associated 95% confidence interval on revenue?

(pp) Show graphically the estimated linear demand with the confidence interval on the individual predictions.

(qq) Construct a table showing the airfare, expected number of passengers, margin of error and lower and upper confidence intervals for following airfares: $25 and $400. Your table should be set up as before.

(rr) Theoretically, where should your predictions be most accurate? Explain fully and provide a specific answer.

(ss) Based on your analysis of the data, are you confident in your predictions? Explain fully.

**Extra Credit Bonus Question**

What is the price elasticity of demand at the airfare of $25 for passengers flying out of Baltimore? Explain your calculations and interpret your answer.