ABIZ 3080 Fall 2021

# Assignment #1
# Due Date: Friday, October 8th

Answer all of the following questions and submit your assignment by 4:00 pm on the due date through UM Learn. Please get in touch with me via email with any questions.

1. Express each of the following in summation notation (i.e. they should look like the questions in question (2) below). (1 mark each)

(a) $y_2 + y_3 + y_4 + y_5$

(b) $y_2z_2 + y_3z_3 + y_4z_4 + y_5z_5$

(c) $a_4b_4^3 + a_5b_5^2$

(d) $(z_3+y_3) + (z_4+y_4) + (z_5+y_5)$

2. Expand each of the following sums (i.e. when you "expand" them they should look like what you see in question (1), above, except that you should get an actual number for questions (a) and (c) below. (1 mark each)

(a) $\sum_{y=1}^{4}(y^3 + y + 5)$

(b) $\sum_{z=1}^{2} f(z, x)$

(c) $\sum_{z=2}^{3} 2z + 1$

3. Based on years of a mild caffeine addiction and a very keen sense of observation, your professor has determined the probability distribution function of *x,* the number cars in the drive-through line at 8:00 am to be as follows:

| *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| *f(x)* | .005 | .025 | .310 | .340 | .220 | .080 | .020 |

(a) Sketch the probability density function for *X* (2 marks)

(b) Find the probability that on a given day more than 3 cars will be in line (2 marks)

(c) Compute the expected value of the random variable *X*. Interpret this result. (3 marks)

(d) Compute the variance and standard deviation of *X* (2 marks each)

4. Please list the following information. (1 mark each)

(a) Why you chose your current major (Agribusiness for most of you).

(b) Your favourite U of M professor/class so far and why.

(c) What you want to do as a career.

(d) What do you consider to be your greatest accomplishment to date.

(e) Who is the most interesting person you ever met and why.

(f) What is the most fun you have ever had.

5. Following the example from the notes in Lecture 1, come up with an interesting/fun econometric example (like when we wrote out the Maple Leaf pork demand example in econometric notation). It does not have to be complicated and it should be something that interests you. Define each of your variables. (5 marks)

6. Given the following observations (x,y): (3,5); (2,2); (1,3); (-1,2); and (0,-3), find the following by hand (no calculator permitted – show all of your work) (15 marks):
a) $\sum x_t^2$ , $\sum x_t y_t$ , $\sum x_t$ , $\sum y_t$ , $\bar{x}, \bar{y}$ (1 mark each)
b) $b_1$ and $b_2$ (2 marks each)
c) Graph $\hat{y} = b_1 + b_2 x_t$ (2 marks)
d) Interpret the meaning of $b_1$ and $b_2$ (1 mark each)
e) Suppose that you know the value of the intercept is zero ( $\beta_1 = 0$). Derive the new equation for $b_2$. (Hint $\frac{\partial S}{\partial \beta} = -2\sum x_t y_t + 2\beta \sum x_t^2$ ) (4 marks)
f) Using your answer from part e) calculate $b_2$ using the (x,y) pairs above (2 marks)

7. A company receives deliveries of a particular component from three suppliers. The following table gives the number of good and defective parts from each supplier as a proportion of total parts received.

| Component | Supplier | | |
|---|---|---|---|
| | A | B | C |
| Good | 0.36 | 0.38 | 0.16 |
| Defective | 0.04 | 0.02 | 0.04 |

(a) If a component is selected at random from all those received, what is the probability that it is defective? (2 marks)

(b) What is the probability that a component from supplier A is defective? (2 marks)

(c) Is the quality of the component independent of the source of supply? (2 marks)

(d) What is the probability that a randomly selected component is from supplier C? (2 marks)

8. One way of valuing the recreational-use benefits of national parks is to estimate the consumer surplus associated with a demand function that relates number of visits to a park to a hypothetical entry price. Lack of data on the number of visits for different entry prices can be a problem, but it can be overcome using the so-called "travel cost method." To utilize this method, data on number of visits and on travel costs (i.e. how much it costs the person visiting the park to get there) are collected, and it is assumed that consumers of recreation react to changes in a hypothetical entry price in the same way as they would to changes in travel costs. Beal (1995) utilizes the travel cost method to estimate the value of Carnarvon Gorge National Park (Queensland, Australia) for recreational use. Her data (8 observations) on number of camping visits demanded ($Q$) for different entry prices ($P$) is stored in the file *surplus.dat* on the course homepage. The unit of measurement for the observations on $Q$ is thousands of visits per year.

(a) Use least squares to estimate a linear demand equation that relates $Q$ to $P$. (3 marks) What is the predicted number of visits for a zero entry price? (2 marks) If price increases from zero to $10, what is the estimated change in the number of visitors per year? (2 marks)

(b) Estimate the consumer surplus as the total area underneath the demand curve. (3 marks)