# Math 321 – Summer 2019

## additional practice for chapter 7, linear regression

1. By hand calculate the linear regression for data in table below.

   (a) Fill in the entire table.

   | $x$ | $y$ | $\bar{x}$ | $\bar{y}$ | $x - \bar{x}$ | $y - \bar{y}$ | $(x - \bar{x})^2$ | $(y - \bar{y})^2$ | $(x - \bar{x})(y - \bar{y})$ |
   |-----|-----|-----------|-----------|---------------|---------------|-------------------|-------------------|------------------------------|
   | 10 | 100 | | | | | | | |
   | 13 | 120 | | | | | | | |
   | 19 | 150 | | | | | | | |
   | 22 | 170 | | | | | | | |

   (b) Find the formula for the regression line.

   (c) Calculate the correlation coefficient and interpret it.

   (d) Calculate the SST, SSR, and SSE.

   (e) Calculate the coefficient of determination and interpret it.

2. The following table shows US National debt in nominal US billions of dollars and US GDP in nominal US billions of dollars from 2010 to 2018.

   |   | Year | Debt | GDP |
   |---|------|------|-----|
   | 1 | 2010 | 13562 | 15069 |
   | 2 | 2011 | 14790 | 15568 |
   | 3 | 2012 | 16066 | 16228 |
   | 4 | 2013 | 16738 | 16907 |
   | 5 | 2014 | 17824 | 17648 |
   | 6 | 2015 | 18151 | 18334 |
   | 7 | 2016 | 19573 | 18820 |
   | 8 | 2017 | 20245 | 19655 |
   | 9 | 2018 | 21516 | 20491 |

   (a) Find a linear regression line fitting GDP as a function of Debt.

   (b) Find and interpret the correlation coefficient.

   (c) Find a 95% CI for the slope of the regression line.

   (d) Find a 95% prediction interval for GDP when US Debt reaches 25000 billion dollars.