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## STAT 608 Homework 02, Summer 2017

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NAME:

EMAIL:

**STATISTICS 608**
**Homework 608 S17 02**
**Due**: *11:59 PM, June 7, 2017*

**Question 1 [1 mark]**

A straight line was fit by least squares to 50 pairs of points using the standard model $y = \beta_0 + \beta_1 x + e$ in which $var(e) = \sigma^2$ is independent of $x$. Suppose that all the usual assumptions are met. The following were part of the regression output:

- sample variance, $S_y^2$, of the 50 response values = 100.
- estimate, $\hat{\sigma}^2$, of the error variance, based on 48 degrees of freedom = 10.

$S_y^2$ and $\hat{\sigma}^2$ are so very different because (choose one)

**(a)** $S_y^2$ was calculated incorrectly;

**(b)** $\hat{\sigma}^2$ was calculated incorrectly;

**(c)** $S_y^2$ is not an estimator of $\sigma^2$;

**(d)** $S_y^2 = 100$ implies that there is a great deal of statistical variation, so the discrepancy is to be expected.

**Question 2** [**3+3 marks**] Work Exercise 1 on page 103 of our textbook.

**Question 3** [**4 marks**] When $Y$ ($> 0$) has mean and variance both equal to $\mu$ it is shown on pages 76 -77 of our textbook that the appropriate transformation of $Y$ to stabilize variance is the square root transformation. Now, suppose that $Y$ has mean equal to $\mu$ and variance equal to $\mu^2$. Find the transformation $Z = f(Y)$ of $Y$ that makes the variance of $Z$ approximately equal to 1.

**Question 4** [**4 marks**] Work Exercise 2 on page 122 of our textbook

**Question 5** [**4+1+2=7 marks**] Work Exercise 3 on page 122 of our textbook