MATH-1140 (DUPRÉ) SPRING 2016 LECTURE QUIZ 2 ANSWERS

1. PRINT YOUR LAST NAME IN THE UPPER RIGHT CORNER IN LARGE CAPITAL LETTERS.

2. PRINT YOUR FIRST NAME UNDERNEATH YOUR LAST NAME IN THE UPPER RIGHT CORNER IN CAPITAL LETTERS.

3. PRINT YOUR LAB DAY AND LAB START TIME UNDERNEATH YOUR FIRST NAME IN THE UPPER RIGHT CORNER.

4. WRITE YOUR SPRING 2016 MATH-1110 COURSE SECTION NUMBER UNDERNEATH YOUR LAB DAY IN THE UPPER RIGHT CORNER.

The remaining problems all use the information that follows. Suppose that Sam has an aquarium tank and he knows that the fish in his tank have an average weight of 15 milligrams with a standard deviation of 4 milligrams. Suppose that Sam also knows the average length of the fish in his aquarium tank is 30 millimeters with a standard deviation of 7 millimeters. Let the unknown W be the weight of a fish Joe has selected from the aquarium, which Sam does not know, and henceforth called "the fish". Let the unknown X be the length of the fish. Sam knows that the correlation of X and W is $\rho = .8$.

5. If the fish is 16 millimeters in length, what is the standardized or z-score for the fish length?

ANSWER: $z_x = (16 - 30)/7 = -2$

6. If Joe tells Sam the fish has length z-score or standardized score of 3, then what should Sam think the raw length score is for the fish?

ANSWER: $x = 30 + (3)(7) = 30 + 21 = 51$

7. What should Sam predict for the fish's weight standardized or z-score using linear regression given the length standardized or z-score is 3?

ANSWER: predict $z_w = \rho z_x = (.8)(3) = 2.4$

8. What should Sam predict for the fish's length standardized or z-score using linear regression given the weight standardized or z-score is 2?

ANSWER: predict $z_x = \rho z_w = (.8)(2) = 1.6$

9. What should Sam expect for his squared error when using linear regression to predict weight from length for the fish?

ANSWER: $E([\textbf{error}]^2|SLR) = \sigma_W^2(1 - \rho^2) = 4^2(1 - (.8)^2) = (16)(.36) = 5.76$

10. What is the covariance of X and W for Sam?

ANSWER: $Cov(X, W) = \rho\sigma_X\sigma_W = (.8)(7)(4) = 22.4$