Homework 5 Chapter 11 (Problems 1 to 5)

Due on March 10

Math 125 *Kovitz* Spring 2025

The key problems on this assignment are problems 2, 3, and 4.

1. A law school finds the following relationship between LSAT scores and first-year scores:

   average LSAT score ≈ 165, SD ≈ 10

   average first-year score ≈ 65, SD ≈ 5, $r \approx 0.80$

   (a) One of these students is chosen at random; you have to guess his first-year score, without being told his LSAT score. How would do this?

   i. Your r.m.s. error would be _____. Options:

   $5 \quad 10 \quad \sqrt{1-0.8^2} \times 5 \quad \sqrt{1-0.8^2} \times 10$

   (b) Now another of these students is chosen at random; you have to guess *his* first-year score, after being told his LSAT score which you are allowed to use. How would do this?

   i. Your r.m.s. error would be _____. Options:

   $5 \quad 10 \quad \sqrt{1-0.8^2} \times 5 \quad \sqrt{1-0.8^2} \times 10$

2. A group of men in the HANE5 survey has an average of 13 years of schooling with an SD of 3 years. Their average blood pressure is 119 mm with an SD of 11 mm. The correlation between years of schooling and blood pressure is -0.18.

   Find the root-mean-square error of the regression line that predicts blood pressure from years of schooling for this group of men. Present the answer in the appropriate units.

3. A small sample (size 20) of men led to the following results (the scatter diagram is football-shaped):

   average height ≈ 175 cm, SD ≈ 10 cm

   average weight ≈ 83 kg, SD ≈ 16 kg, $r \approx 0.48$

   (a) Find the r.m.s. error for the regression prediction of height from weight.

   (b) Find the r.m.s. error for the regression prediction of weight from height.

4. Applicants to a European prep school are required to take tests in various subjects. Applicants who score high on the mathematics test also tend to score high on the physics test. On both tests, the average score is 55; the SDs are the same too. The scatter diagram is football-shaped. Of the students who scored about 70 on the mathematics test:

   (a) just about half scored over 70 on the physics test.

   (b) more than half scored over 70 on the physics test.

   (c) less than half scored over 70 on the physics test.

5. On a quiz with ten questions, no part credit is given. Each student answered all ten questions. After grading, the instructor records for each student the number of questions the student got right and the number wrong. The average number of right answers is 4.3 with an SD of 2.0.

   The average number of wrong answers is _____ with an SD of _____. Fill in the blanks—or do you need the data? Explain briefly.