# Stat 2 Fall 2010: Midterm Review                                    S.M. Stoyanov

**WARNING: these questions are just intended to give you a *flavor* of the kind of questions you can expect on the exam. Do NOT expect that your exam questions will be identical to these.**
**Please show ALL YOUR WORK AND REASONING for ALL the problems.**

1. For the following examples, indicate whether they are observational studies or controlled experiments.

   (a) Over a 4-month period, among 30 people with bipolar disorder, patients who were given a high dose (10g/day) of omega-3 fats from fish oil improved more than those given a placebo.

   (b) In a test of roughly 200 men and women, those with moderately high blood pressure did worse on tests of memory and reaction time than those with normal blood pressure.

   (c) It may sound counterintuitive, but a study that randomly assigned dieters to different sleep regimens found that participants allowed only five and a half hours in bed at night lost less flab than those who spent eight and a half hours in bed and got more sleep.

   (d) A study of young children found that those with more body fat tended to have more "controlling" mothers.

   (e) Among a group of disabled women aged 65 and older who were tracked for several years, those who had a vitamin $B_{12}$ deficiency were twice as likely to suffer severe depression as those who did not.

2. Fill in the blanks:

   (a) The SD of a list is 0. This means that _____ .

   (b) The r.m.s. size of a list is 0. This means that _____ .
   Options:

      i. there are no numbers on the list.
      ii. all the numbers on the list are the same.
      iii. all the numbers on the list are 0.
      iv. the average of the list is 0.

3. A distribution table is shown below. The table gives the distribution of cholesterol level for 6000 children, 4 to 19 years old. Cholesterol level is measured in milligrams. The class intervals include the left endpoint, but not the right.

   | Cholesterol (mg) | Percent |
   | --- | --- |
   | 0 - 140 | 24 |
   | 140-180 | 52 |
   | 180-200 | 16 |
   | 200 - 240 | 8 |

   (a) Draw the histogram carefully. Mark the horizontal scale, and the vertical scale.

   (b) Is the median greater or less than 160 mg? Or do we not have enough information?

   (c) Is the average greater or less than 160 mg? Or do we not have enough information?

4. For a certain group of women, the 25th percentile of height is 62.2 inches, and the 75th percentile is 65.8 inches. The histogram follows the normal curve. Find the 90th percentile of the height distribution.

5. A US firm is preparing a report on climate change and in one set of scatter diagrams, the $x$-axis shows temperature changes in ℃, the $y$-axis precipitation changes in percent for the various regions of the world. A certain US senator reading the report complained that he was not used to the Celsius scale, and could they change it to Fahrenheit.

   (a) Could we compute the new correlation of the temperature change (in ℉) and precipitation?

   (b) What is the correlation between the temperature in ℃ and ℉?

6. For the first-year students at a certain university, the average GPA was 2.6, and the SD was 0.6. The correlation between SAT scores and first-year GPA was 0.46. The SAT scores followed the normal curve. Estimate the average first-year GPA for students whose percentile rank on the SAT was 77%.

7. Verbal SAT scores and math SAT scores of students in a county are positively correlated and the scatter diagram is football shaped. The VSAT scores have an average of 450 points and an SD of 100 points. The MSAT scores have an average of 425 points and an SD of 110 points. One of the students scores 600 on the VSAT and 590 on the MSAT. Her MSAT score
(i) is less than (ii) is equal to (iii) is more than (iv) cannot be compared, based on the information given, to the average MSAT score of students who have the same VSAT score as she does. Pick one option.

8. An incoming freshman took her college's placement exams in French and mathematics. In French, she scored 82, and in math 86. The overall results on the French exam had an average of 72 and an SD of 8. For the math exam, the average was 68, and the SD was 12. On which exam did she do better, compared with the other freshman?

9. An investigator wants to use a straight line to predict IQ from number of words in the vocabulary, for a representative group of children aged 2-5. There is some positive association in the data. State whether the following are true (**T**) or false (**F**) by circling the appropriate response. You do **not** need to explain your answer. (2 points each)

   (a) He can use many different lines. **T** **F**

   (b) He must use the regression line. **T** **F**

   (c) Only the regression line has an r.m.s. error. **T** **F**

   (d) Any line he uses will have r.m.s. error. **T** **F**

   (e) Among all lines, the regression line will have the smallest r.m.s. error. **T** **F**

10. A study is made of the age at entrance of college freshmen. If we assume that the distribution of entering freshmen's ages follows the normal curve, would you guess the SD of their ages to be about 1 month, 1 year, or 5 years? Why?

11. Studies find a negative correlation between hours spent playing video games and sociability (using a well-defined measure). Can we conclude that playing video games makes people less social?

12. $A$ and $B$ are independent events. The chance of $A$ is 0.3, and the chance of $B$ is 0.5. Fill in the blanks, choosing from the options given below. Explain your answer.

   (a) The chance of **both $A$ and $B$** happening is _____.
       (i)0.15      (ii) 0      (iii)0.8      (iv) 0.3      (v) 0.5      (vi) 0.65      (vii)Need more information.

   (b) The chance of $A$ happening, **given** that $B$ happened is _____.
       (i)0.15      (ii) 0      (iii)0.8      (iv) 0.3      (v) 0.5      (vi) 0.65      (vii)Need more information.

   (c) The chance of **either $A$ or $B$** happening is _____.
       (i)0.15      (ii) 0      (iii)0.8      (iv) 0.3      (v) 0.5      (vi) 0.65      (vii)Need more information.

13. A box contains 6 tickets, numbered 1 through 6. Three tickets are drawn at random, without replacement, from the box. Find the chance that the three tickets left in the box are 4, 5, and 6.

14. I have two boxes. Box A contains 2 gold coins and 3 silver coins. Box B contains 4 gold coins and 1 silver coin. I pick a box at random, then a coin at random from that box. What is the chance that I get a gold coin?