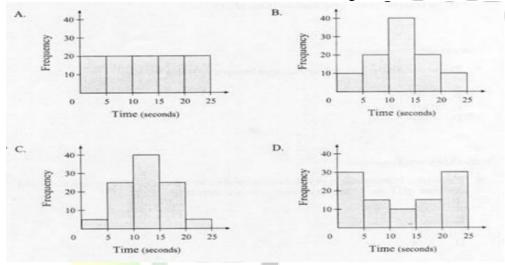


# Practical Data Science (Univariate Stats)

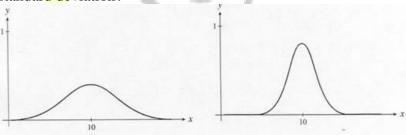
### Solve the following problems.

#### **Problem 1: Mean and Standard Deviation**

- I. A teacher adjusts the marks of an examination by raising each score by 5 percent. What happens to mean and standard deviation?
- II. Would you expect the following marks of an examination to have small or large standard deviation? 92 93 92 94 92 91 92
- III. Which set of data would have the smallest and largest standard deviation?



- IV. If a set of data has a standard deviation of 0, then:
  - A. the mean of the data must be 0
  - B. all of the data values are the same
  - C. the data values collected had a sum of 0
  - D. the z-score of the mean of the data is equal to 1
- V. Which of the two normal distributions graphed in the diagrams below has a higher standard deviation?



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VI. Henry played 24 golf games on the same course during each of two seasons. In the first season, his mean score was 75 with a standard deviation of 2.1. In the second season, his mean score was 74 with a standard deviation of 3.8. Examining the standard deviation of Henry's score for the two seasons, one could conclude which one of the following would be true:

- A. scores were more consistent in the first season
- B. scores were more consistent in the second season
- C. average score was better in the first season
- D. average score was better in the second season

#### **Problem 2: Z-Scores**

- I. The average mark on a test was 58.3 with a standard deviation of 6.7. The zscore of a particular mark was -1.3, what was the mark on test?
- II. A teacher marks some exams and finds the mean is 54% and the standard deviation is 8%. The teacher then adjusts the marks by raising the mean to 60% and raising the standard deviation to 9%. The z-scores are kept constant. If the student scored 76% initially, what would be their new mark be?

### **Problem 3: Comparing among distributions**

Paul got a mark of 75 on a math test with a mean of 61 and a standard deviation of 12. He got 72 on a chemistry exam with mean 63 and standard deviation 7. If the marks on both tests were normally distributed, on which test did he do better relative to the class?

### **Problem 4: Normality Test**

Load data "income.csv" available under datasets(github of algorithmica) branch into R data frame. Do the following things:

- a) Obtain descriptive statistics for "income", "edu", and "expr". The statistics should include number of observations, min, max, mean, median, std, skewness, kurtosis, quantile(0.25), quantile(0.75).
- b) Does income, education and expr of all people follows normal distribution individually?
- c) Does income, education and expr of male people follows normal distribution individually?
- d) Does income, education and expr of female people follows normal distribution individually?