

MTH1005M PROBABILITY AND STATISTICS PRACTICAL 1

TOPICS: Sample Spaces, calculation of probabilities of events occurring in simple sample spaces with equally likely outcomes.

Students are advised to solve by themselves the exercises unfinished during the Practical hour. Practical exercises are designed to help the students to be more confident in solving the Coursework(s) exercises.

Q1: Construct a stem-and-leaf display of the following data.

5.9 7.2 7.3 6.3 8.1 6.8 7.0 7.6 6.8 6.5 7.0 6.3 7.9 9.0 8.2 8.7 7.8 9.7 7.4 7.7 9.7 7.8 7.7
11.6 11.3 11.8 10.7

- b. What appears to be a representative value? Do the observations appear to be highly concentrated about the representative value or rather spread out?
 - c. Does the display appear to be reasonably symmetric about a representative value, or would you describe its shape in some other way?
 - d. Do there appear to be any outlying values?
 - e. What proportion of strength observations in this sample exceed 10?
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Q2: How does the speed of a runner vary over the course of a marathon (a distance of 42.195 km)? Consider determining both the time to run the first 5 km and the time to run between

the 35-km and 40-km points, and then subtracting the former time from the latter time. A positive value of this difference corresponds to a runner slowing down toward the end of the race. The accompanying histogram is based on times of runners who participated in several different Japanese marathons ("Factors Affecting Runners? Marathon Performance," Chance, Fall, 1993: 24-30).

1. What are some interesting features of this histogram?
2. What is a typical difference value?
3. Roughly what proportion of the runners ran the late distance more quickly than the early distance?

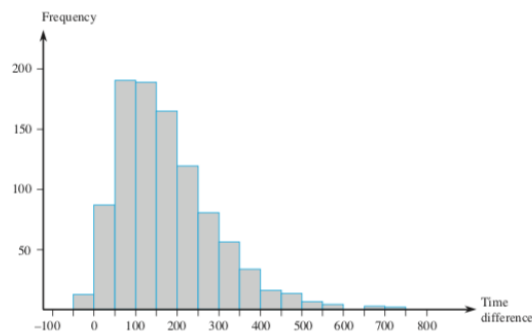


Figure 0.1: Problem 2

Q3: The article "Statistical Modeling of the Time Course of Tantrum Anger? (Annals of Applied Stats, 2009: 1013-1034) discussed how anger intensity in children's tantrums could be

related to tantrum duration as well as behavioral indicators such as shouting, stamping, and pushing or pulling. The following frequency distribution was given (and also the corresponding histogram):

0-< 2: 136
2-< 4: 92
4-<11: 71
11-<20: 26
20-<30: 7
30-<40: 3

Draw the histogram and then comment on any interesting features.

Q4: Give a possible sample space S for each of the following experiments:

1. An election decides between two candidates A and B.
 2. A two-sided coin is tossed.
 3. A student is asked for the month of the year and the day of the week on which her birthday falls.
 4. A student is chosen at random from a class of ten students.
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Q5: Let $S = \{a, b, c\}$ be a sample space. Let $P(\{a\}) = 1/2$, $P(\{b\}) = 1/3$, and $P(\{c\}) = 1/6$. Find the probabilities for all eight subsets of S (Hint, the empty set \emptyset is considered to be a subset of all sets)

Q6: A die is loaded in such a way that the probability of each face turning up is proportional to the number of dots on that face. (For example, a six is three times as probable as a two.)

- Write down a sample space for the experiment of rolling this die
- Work out the probability function for this die
- What is the probability of getting an even number in one throw?