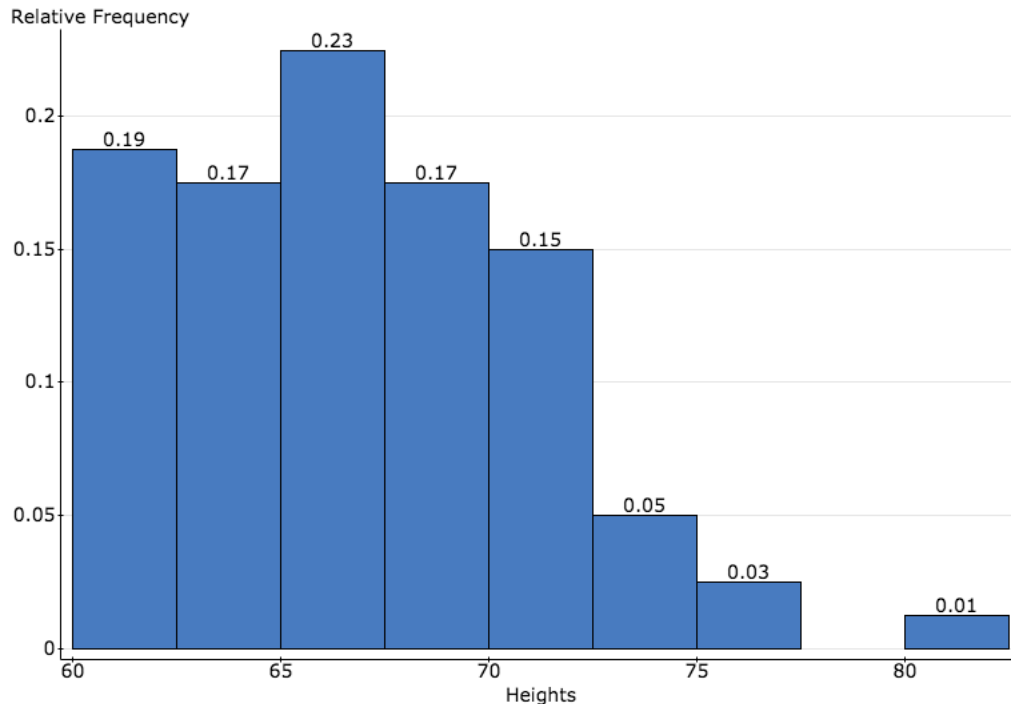


STAT651, 2019 Homework 2

This HW will not use JMP and are pencil and paper calculations for calculating basic probabilities and, importantly, interpreting these probabilities and the assumptions under which they were calculated.

- (1) The following plot is a relative frequency histogram of heights of students (in inches) in a class. Each bin is half open. For example, the proportions of students in the class whose height between $[60, 62.5)$ is 0.19. Or if X denotes the height of a student in this class (in inches), then $P(60 \leq X < 62.5) = 0.19$ (=19%)

Use the plot below to calculate the probabilities.



- (i) $P(60 \leq X < 65 | 60 \leq X < 70)$?
- (ii) $P(70 \leq X < 75 | 60 \leq X < 70)$?
- (iii) $P(65 \leq X < 70 | 65 \leq X < 67.5)$?
- (2) A doctor wants to investigate the probability that two siblings are over 9.5 pounds when born. She uses the following information.
- The probability a newborn baby is over 9.5 pounds is 0.05.
- The probability that a new born baby is over 9.5 pounds *given* that its older sibling birth weight is over 9.5 pounds is 0.2.
- (a) Calculate the probability that both siblings are over 9.5 pounds.
- (b) Based on the information above do you think the birth weight of siblings are independent of each other? Give a reason for your answer.

- (3) HB and DA are agents in a call center. After each call the customer they are dealing has to rate the agent (satisfactory or not satisfactory). The ratings over a two week period are collected and given below.

| Satisfied? | HB | DA | |
|------------|-----|-----|-----|
| Yes | 172 | 118 | 290 |
| No | 28 | 82 | 110 |
| Totals | 200 | 200 | |

- (a) Based on the data what proportion of customers are satisfied with HB and what proportion of customers are satisfied with DA? What does the data suggest about the performance of the agents as compared with each other?
- (b) The counts are broken down into individual weeks:

| Satisfied? | HB | DA | | Satisfied? | HB | DA | |
|------------|-----|----|-----|------------|----|-----|-----|
| Yes | 162 | 19 | 181 | Yes | 10 | 99 | 109 |
| No | 18 | 1 | 19 | No | 10 | 81 | 91 |
| Totals | 180 | 20 | 200 | Totals | 20 | 180 | 200 |

Table 1: Week 1 on the left and Week 2 on the right

Calculate the satisfactory ratings for both agents for each of the weeks separately. What do you observe?

- (c) At the start of Week 2 a new software update was released. How does this reflect in the ratings?