Class Height Data - Practice Examples

Let $M_i$ and $F_i$ refer to the heights of male and female students. Both are approximately normally distributed.

$$\sum_i M_i = 6255 \quad \sum_i F_i = 8475 \quad \sum_i M_i^2 = 1119401$$

$$\sum_i F_i^2 = 1384221 \quad n_M = 35 \quad n_F = 52$$

Of the 52 female students, 33 are taller than their mother, and 19 are shorter. If $d = (\text{student height} - \text{mother's height})$, then for the 52 female students

$$\bar{d} = 2.94\text{ cm} \quad s_d = 7.389\text{ cm}.$$  

Questions

1. What is the mean and variance of male and female student’s height?

2. What are the 99% confidence limits for these measures on the males?

3. Are male students taller on average than female students?

4. Is the mean height of female students significantly different from 155 cm?

5. Is the variance of male height significantly different from the variance of female height?

6. Are female students on average taller than their mothers? Assume normality.

7. Assume that the differences between mother and daughter are not normally distributed. Are daughters significantly different in height from their mothers?

8. Assume that the differences between mother and daughter are not normally distributed. Are daughters significantly taller than their mothers?

9. Balloons at a circus have a 25% chance of having red dots, and a 37% chance of having blue dots.

   a. If having red and blue dots are independent, then what is the probability of a balloon having red and blue dots? What is the probability of a balloon having neither red nor blue dots?

   b. If having red dots and having blue dots are mutually exclusive, then what is the probability of a balloon having red and blue dots? What is the probability of a balloon having neither red nor blue dots?
**Linear Fit**

dad's height = 98.9478 + 0.46991 mom's height

**Summary of Fit**

| Term                | Estimate | Std Error | t Ratio | Prob>|t| |
|---------------------|----------|-----------|---------|-------|
| Intercept           | 98.94776 | 17.48966  | 5.66    | <.0001|
| mom's height        | 0.4699108| 0.108899  | 4.32    | <.0001|
\[ \Sigma M = 13957 \]
\[ \Sigma D = 15167 \]
\[ \Sigma M^2 = 2244073 \]
\[ \Sigma D^2 = 2650279 \]
\[ \Sigma MD = 2435528 \]

- Is there a significant relationship between parent's heights?
- Test \( \rho = 0 \).
- What's the best prediction of a father's height, given information about his partner's height?
- What is the best prediction of the height of a man married to a woman who is 165cm tall?
- Test \( \beta = 0 \). What is the 95\% C.I. for \( \beta \)? (0.47±0.21)
- Is there any reason to use non-parametric statistics for these data?
- Using the data from the parents, are men on average taller than women?

Taking information about whether individuals were left or right-hand dominant, as compared to whether their mother were left or right-dominant resulted in the following data:

<table>
<thead>
<tr>
<th></th>
<th>Student Left-handed</th>
<th>Student Right-Handed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother Left-handed</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Mother Right-Handed</td>
<td>8</td>
<td>72</td>
</tr>
</tbody>
</table>

What test can you use to analyze whether there is a significant relationship between mother and offspring handedness? <<Careful>>

If you had 20 times as much data, which test could you use?