Prelab 1

1. (1 pt.) How many times should you roll each die to see if they are severely biased? How many times should you roll each die that is not obviously biased?

2. (1 pt.) What kind of statistical test will you apply to assess the fairness of the dice?

3. (1 pt.) How low should the $p$-value (likelihood of fit) be to assume the die is loaded? How high should the $p$-value be to be reasonably confident that the die is fair?

4. (4 pts.) The result of six measurements of the length of a rod (in meters) are: 3.4, 3.44, 3.2, 3.25, 3.37, and 3.33. Compute the mean, standard deviation, and standard error for this data set.

5. (4 pts.) The tally of 100 coin tosses was 45 heads. Use $\chi^2$ and the likelihood of fit to argue whether or not the coin is fair (you will need to use Excel’s chidist function).
6. (5 pts.) Toss a coin 40 times and tally the results. Calculate $\chi^2$ and comment on the fairness of your coin (again, you will need to use chidist).

7. (9 pts.) The result of 60 tosses of a die yielded the following results. Plot the histogram. Calculate $\chi^2$ and the likelihood of fit (use the table in Appendix A). Is the die fair?

<table>
<thead>
<tr>
<th>Die Face</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Tosses</td>
<td>9</td>
<td>14</td>
<td>16</td>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
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