

Biostatistics Math 6397 – Project 3

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Note: Please include all your work, printouts of R code, etc, with your answer.

1 Introduction

In this project, we study the effect of wing to body size ratio of fruit flies on their ability to escape from a spider. We test the hypothesis that flies with heavier bodies relative to their wing size are more vulnerable. Several fruit flies with low body to wing size ratio (classified as ‘light’) were trapped in a jar with two spiders and observed over a period of 8 days. A similar experiment was conducted for fruit flies with high body to wing size ratio (classified as ‘heavy’). Six different replicates of such experiments were conducted for each of the two types. Table 1 lists the total number of flies that were consumed, in all six replicates, during each consecutive 48-hour period, for each of the ‘Heavy’ and the ‘light’ flies.

	Light	Heavy	Total
≤ 48 Hrs	16	27	43
48 - 96 Hrs	6	10	16
96 - 144 Hrs	7	6	13
144 - 192 Hrs	5	7	12
Alive after 192 Hrs	71	55	126
Total	105	105	210

Table 1: Number of flies consumed by wing loading

2 Hypothesis testing

Assume that the consumption rate of the spiders is constant within each of the 48-hour periods.

1. Can the survival probability per 48 hours for the combined population (light+heavy) be assumed to stay constant over the entire study? Perform an appropriate test.
2. Test whether the ‘heavy’ flies are significantly more vulnerable than the ‘light’ flies. If necessary, split into a test for each time interval and adjust the significance level appropriately.