MSAN 631: Design and Analysis of Experiments

Lab 1: The Helicopter Experiment
Due: Thursday May 31, 2018

Problem Description:
In self-selected groups, you will endeavor to optimize the design of a paper helicopter, such that flight time is maximized. Note that the helicopter schematic is presented in the Appendix.

Please restrict your experiment to 8.5" x 11" sheets of standard printer paper and use the **entire** sheet of paper for each helicopter.

For this exercise you will be free to choose which design factors (x's) you believe influence the flight time (y). You may also choose any number of levels for each of these factors. Define a 'condition' as a unique combination of factor levels (i.e., a condition corresponds to a specific helicopter design). The goal is to choose the design that maximizes the time between dropping the helicopter and it hitting the floor.

Deliverable:
Please prepare a short report that describes the experimental design and explains all choices regarding design factors, nuisance factors and allowed-to-vary factors (z's). Please explain your incorporation of randomization, replication, and blocking. If these design principles were not incorporated, explain why not, and any potential limitations that may result.

This report should also provide a summary of the data and an analysis of the results. Please note that this analysis need not be overly formal. Because we have not yet learned how to properly analyze experiments, this Lab is meant to challenge your ability to thoughtfully design and carry out an experiment. Even still, through some statistical analysis, an optimal helicopter design should be chosen.

In this report, please also provide a detailed description of this optimal helicopter design (including dimensions, cutting and folding instructions, etc.) such that I can construct it out of a sheet of paper myself.

Grading:
The members of each group will receive a common grade out of 20. Groups will be graded on the adequacy and efficiency of the experiment and the reports will be graded on the quality of the written exposition.

Appendix: Helicopter Schematic