Statistical Computing
Activity 5: The Sorting Hat

The Hogwarts School of Witchcraft and Wizardry has hired you as an R programming wizard to replace its now-dilapidated sorting hat. In this activity you will create a sorting hat program to decide whether a given student belongs in Gryffindor, Slytherin, Ravenclaw, or Hufflepuff.

You and your partner are going to write R code to complete this activity. You should only be editing one document and doing it together.

1 Students

Make a function that will output an S3 object of the class "student." The function will take in an argument "name." Each student should hold four values called, name, courage, ambition, intelligence, and effort. The function should *randomly* assign integer values to these traits ranging from 1-100.

2 Sorter

Create method for the generic `sort` that takes in as argument

- An object of the class `student`
- A matrix with four columns and four rows (X).

Let a be the vector of values for the attributes (courage, ambition, intelligence, effort). The sort method should perform the following calculations.

1) Calculate $X^T a$, which should result in a vector of length three.

2) If the first element of the resulting vector is largest, return "GRYFFINDOR!", if the second element is largest return "SLYTHERIN!", if the third is largest return "RAVENCLAW!", if the fourth is largest return "HUFFLEPUFF!"

3 Modifications

Alter the sort function the student included in the call is changed in the global environment such that student is assigned a second class (e.g., "Gryffindor"). Note that the student will now have two class labels.

4 Curfew

Create four new environments called, “Gryffindor_Tower”, “Black_Lake”, “Ravenclaw_Tower”, and “Basement”. These are the dormitories for the Gryffindor, Slytherin, Ravenclaw, and Hufflepuff students respectively.

Create a generic function called “curfew”, and then create curfew methods for each house that that takes a student as input and changes their environment to their appropriate dorm.