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Homework 1

Problem 1

1) 55. Where X could take any value from 0 to 55.

2) One point could be: (2, 3) = X = 5 = Where girl students ranked in the 2nd and 3rd places, and male students ranked elsewhere.

3) The probability function is based off the counting rules where order doesn't matter and we are just looking for the distinct combination of the sums of the ranks.

4) P(X = 0) = 1 / 2046. P(X = 1) = 1 / 2046

Problem 2

1) The binomial distribution fits this scenario.
2) Mean = 4(0.12) = 0.48; Standard deviation = $\sqrt{4(0.12)(0.88)}$ = 0.6499
3) Calculate P (X <= 3) = 1 – P (X = 4) = 1 - $\binom{4}{4}0.12^4 0.88^0$ = 0.9997

Problem 3

Necessitated by a consistent theme of circular reasoning between education and use of p = 0.05, as well as 'radical choices' by groups like *Basic and Applied Social Psychology*, the ASA asked one statistician to form a group of members holding diverse views on the p-value standard for null hypothesis testing (Wasserstein & Lazar 2016). Their committee went to work with identifying one informal definition, six principles the p-value holds, and a conclusion defining best practice.

To start, the informal definition includes text that may seem new to some readers. That fresh texture lies quite early in the definition: "a p-value is the probability under a specified statistical model…" (Wasserstein & Lazar 2016). With the phrase "under a statistical model" I certainly cannot remember the time that my statistics books outlined an assumption of the model used to compute the p-value. Text books seem to imply this requirement in the formal definition of a p-value without explicitly statement. This addition was at least eye opening to me. Furthering from the informal definition, the group formed six principles on the p-value.

Out of the six principles, two of the principles deal with the notion that a p-value should not be the sole determining factor for statistical. Principle three covers how a p-value falling on one side of a threshold does not necessitate the sole proof or backing for a scientific or business decision. Instead, couple said p-value with "design of a study, quality of measurements, the external evidence for the phenomenon under study, and the validity of assumptions that underlie the data analysis" and you will have a solid backing for your decision. Principle six reiterates that p-values are not the be all end all for data analysis.

Finally, the conclusion, as if to beat the same drum as the principles three and six, states that the p-value in and of itself is not the final step in data analysis but should be one of the tools to back a decision alongside the alternatives proposed in the article. Last, but not least, the ASA leaves with "No single index should substitute for scientific reasoning" (Wasserstein & Lazar 2016). With multiple points of proof for business or scientific conclusions state so heavily, the ASA cannot help but reiterate the necessity of using the full gamut of statistical proof in the decision-making process.