Homework 1

Math 669, Spring 2022

This homework is due on Wednesday, January 26

1. Consider the following data arising from two treatments A and B: 40 of 100 men who received Treatment A recovered, 21 of 50 men who received Treatment B recovered, 5 of 50 women who received Treatment A recovered, and n of 100 women who received Treatment B recovered. What values of n give rise to *Simpson's paradox*?

2. This problem pertains to the article, *Models in biology: accurate descriptions of our pathetic thinking* by Jeremy Gunawardena (BMC Biology 2014), available here:
   `https://doi.org/10.1186/1741-7007-12-29`

   (a) Read pages 1–3. What is the difference between forward and reverse modeling?

   (b) Read the description of one of the three models, and page 10. For the model you picked, what is the main message of the author?

3. Pick a published mathematical biology paper, for instance, from the collection of articles in the *Bulletin of Mathematical Biology* celebrating, on the occasion of his 90th birthday, the contribution of James Murray, available here:
   `https://link.springer.com/collections/ahejfhjibb`

   (a) State the title and authors.

   (b) State (in several sentences) the main scientific and/or mathematical question(s) that the paper addresses.

   (c) Does the paper involve forward or reverse modeling (or neither)? Explain.

4. What topics from biology and/or math would you like to learn more about? Explain.

5. Complete the survey (separate handout).