HW6, Theory of Inference 2015/6

Jonathan Rougier
School of Mathematics
University of Bristol UK

With these questions, you can get a feeling for how much detail is required by the tariff; the last question, for example, requires quite a lot of detail for 15 marks. Remember this very general advice about answering exam questions in maths: (i) make sure you have defined all of the terms in the question, and (ii) if you are asked to prove something, make sure you state exactly what it is you need to show.

1. Suppose that $Y \sim \text{Binomial}(p, n)$ where $p \in [0, 1]$ and n is specified. Give an example of a composite hypothesis with zero measure. [5 marks]

2. Apparently, 71 people out of 103 experienced 'enhanced gastric transport' after eating a serving of probiotic yogurt each day for two weeks. Starting from the model $Y \sim \text{Binomial}(p, n = 103)$, with $p \in [0, 1]$, sketch a Wilks 95% confidence set for p. You should provide as much information as you can without using a calculator. [10 marks]

3. Suppose you wanted to test the null hypothesis $H_0 : p = 0.8$, and you had found out that 0.8 was outside the Wilks 95% confident set. How would you go about computing the P-value for H_0; illustrate with a sketch. [10 marks]

4. Suppose instead that you were asked to compute the P-value of $f_0 = \text{Binomial}(p = 0.8, n = 103)$ directly, using the test statistic $t(y) = y$.

Provide a sketch showing the value that you would compute. Again, provide as much detail as you can without using a calculator. [10 marks]

5. Outline Fisher's dichotomy for interpreting P-values, and explain the main difficulty with this interpretation. [15 marks]