PRACTICE FINAL STAT 417, FALL 2019

1. (10pt) Suppose that $X_1, \ldots, X_n \sim Unif[0, \theta]$ where the parameter $\theta > 0$. What is the method of moments estimator for θ?

   Solution: $E\,X = \frac{\theta}{2}$; substituting the first sample moment for the expectation we have $\bar{X} = \frac{\hat{\theta}}{2}$ and so $\hat{\theta} = 2\bar{X}$.

2. (10pt) Question 7.1.1. from the textbook (you can find its solution at the back of our textbook).

3. (10pt) Question 7.2.13 from the textbook, parts a) and c). The solution is at the end of the textbook.

4. (10pt) Suppose we want to check a computer's random digit generator, which is supposed to provide uniformly distributed digits from 0 to 9. We generated a random sample of 200 digits on the computer and the obtained observed frequencies are summarized in the table below. The null hypothesis is that the distribution of generated digits is uniform, that is, the probability of each digit is 0.1 and all the expected frequencies are, therefore, equal to 20. Test the null hypothesis using a p-value approach.

digit	0	1	2	3	4	5	6	7	8	9
observed frequency	25	17	19	23	21	17	14	17	21	26
expected frequency	20	20	20	20	20	20	20	20	20	20

   Solution: Pearson's χ^2 statistic is $\chi^2 = \sum_{j=0}^{0} \frac{(O_j - E_j)^2}{E_j} = 6.80$ and so the P-value is $P(\chi^2_9 \geq 6.80) = 0.66$. The null hypothesis cannot be rejected at any reasonable level of α.