Math 339SP, Spring 2024 — Homework 7

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Due March 29 at 5:00 pm

Instructions. This problem set covers material from Week 9 of class, with a focus on Chapter 6 of the textbook.

Problem 1. Try the following exercises from Chapter 6.

1. Exercise 6.2
2. Exercise 6.3
3. Exercise 6.4
4. Exercise 6.5
5. Exercise 6.6. This problem will get reduced to solving an equation of the form $f(\lambda) = 0$ that can only be solved numerically. That is, a closed form expression for λ cannot be given. State the equation that must be solved and then use the R function `uniroot` to give a numerical approximation of its solution. The code below gives an example of its usage. The first line sets up a function f. The second line looks for a solution to the equation $f(x) = 0$ in, for example, the interval $(3, 4)$.

```
f = function(x) sin(x)
uniroot(f, c(3,4))$root
```

6. Exercise 6.13, part a. Your goal in this problem is to take $P(N_s = k \mid N_t = n)$ and simplify it to reveal that the conditional distribution of N_s given $N_t = n$ is binomial. Your solution should give the steps of your derivation and conclude with the parameters of the binomial distribution.)