PhD Preliminary Exam in Probability & Statistics, Fall 2021

Answer all 7 questions. Each part of each question is worth 5 points. Give numerical answers whenever possible.

The exam duration is 4 hours. The exam is closed notes. The students are allowed to use a graphing calculator.

Normal, t and ^{2} tables are attached to the exam.

1. Let $X_1; X_2; : : : ; X_n$ be independent random variables with PDF

$$f(x\,j\,) = \begin{cases} (\ ^1\!=\!x^{\frac{1}{}} & \text{for } 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

with the parameter > 0.

2

n

4. A baseball player will go to the plate six times during a game. 20% of the time that the player goes to the plate, he gets a walk, and thus cannot get a hit. The other 80% of the time, the player gets an o cial \at bat". For each \at bat", there is a 30% chance of getting a hit.

   (a) Use conditioning to determine the player's expected number of hits per game.