Math 4610 - Review for Exam 3 **(April 2016)** **P. Allaart**

SHOW ALL YOUR WORK! NO WORK=NO CREDIT!!

1. Amy and Beth take turns rolling a fair die, with Amy going first. Amy wins the game if she rolls a 5 or a 6 before Beth rolls a 4, 5 or 6. (Note Amy does not win if she rolls a 4.) Calculate the chance that Amy wins the game.

2. Two dice are rolled repeatedly until the sum of the two dice is 10 or more.

a) What is the probability that exactly 5 rolls are needed? (Count each time you roll the dice as one roll).

b) Find the expected number of rolls.

3. Let X_1, X_2, X_3 be independent uniform$(0,1)$ random variables, and let Y be the rightmost point among them. (That is, $Y = \max\{X_1, X_2, X_3\}$.) Find the c.d.f. and density function of Y.

4. A waitress earns tips that have a mean of \$5.00 and a standard deviation of \$1.50. If she collects 30 tips in one week, find the approximate probability that the total amount of her tips exceeds \$170. State clearly any assumptions that you make.

5. Find the number c such that the function

$$f(x) = \begin{cases} c\sqrt{x}, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

is the density function of some random variable.

6. A baker makes cookies that contain, on the average, four raisins per cookie. Assume the number of raisins in a cookie has a Poisson distribution.

a) Find the probability, to four decimal places, that a particular cookie contains at least one raisin.

b) If you buy two cookies, what is the chance (to four decimal places) that you will get exactly 8 raisins in total?

c) The baker guarantees that 95% of her cookies contain at least one raisin. By how much can she reduce the average number of raisins per cookie without violating the guarantee? Round your answer to one place behind the decimal point.

7. Let X be a uniform$(0,4)$ random variable, and let $Y = \sqrt{X}$. Find the c.d.f. and density function of Y (in that order!). Specify where your formulas are valid.

8. Let T be an exponential(λ) random variable with $\lambda > 1$. Compute

$$E(e^T).$$

(*Note*: This is NOT the same as $e^{E(T)}$!!)