CSE 312 : Practice Quiz 2

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Instructions

- You have twenty-five minutes to complete this exam.
- You are permitted one piece of 8.5x11 inch paper with handwritten notes (notes are allowed on both sides of the paper). You should also get a provided formula sheet (in section it'll be on different colored paper separate from the exam; if you take the exam with DRS it will be the last page of your exam).
- You may not use a calculator or any other electronic devices during the exam.
- We will be scanning your exams before grading them. Please write legibly, and avoid writing up to the edge of the paper.
- If you run out of room, you may also use the last page for extra space, but tell us where to find your answer if it's not right below the problem.
- Since you don't have a calculator, you are generally free to **not** simplify expressions (though you may if you think it will be helpful).
- In general, you should show us the work you used to get to an answer, and explanations will help us reward partial credit, but we do **not** expect explanations at the level we usually require on homeworks.

Advice

- Writing a few words about where an expression came from is often very helpful for awarding partial credit.
- Remember to take deep breaths.

Question	**Max points**
PDFs and CDFs	20
Normals	10
Total	**30**

1. PDFs and CDFs

Let $f_X(x) = \begin{cases} cx^2 & \text{for } 1 \leq x \leq 5 \\ 0 & \text{otherwise} \end{cases}$

(a) What value of c makes the PDF valid?

(b) Compute $\mathbb{P}(1 \leq X \leq 2)$. For this part and all remaining parts, you may leave c as an unknown constant in the computation.

(c) Find the Expected value of X.

(d) Find the Variance of X.

(e) Find the PDF for the following CDF. Be sure to include all cases.

Treat n as an unknown positive integer constant.

$$F_Y(y) = \begin{cases} 0 & \text{for } y < 0 \\ y^n & \text{for } 0 \leq y \leq 1 \\ 1 & \text{for } y > 1 \end{cases}$$

2. CLT

Suppose I have a flashlight which requires one battery to operate, and I have 18 identical batteries. I want to go camping for a week ($24 \times 7 = 168$ hours). If the lifetime of a single battery is a random variable distributed as an Exp(0.1)? **Estimate** this probability using the Central Limit Theorem. Do not compute it exactly.

You SHOULD NOT lookup values in the z-table for this problem. Instead, your solution should be an expression with Φ that can be evaluated using the lookup table (i.e. all inputs to Φ are non-negative) and a calculator (i.e. the input to Φ does not need to be simplified).

Suppose you are using the CLT to approximate the probability $X \leq 10$, where X is a binomial random variable with n (the number of trials) equal to 20. What event would you use after doing a continuity correction?

If you run out of space on a prior problem, write more here (and tell us to look here).