

# CSE 312 : Practice Quiz 2 Form 2

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## Instructions

- You have twenty 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
Independence	9
Bayes	16
<b>Total</b>	<b>25</b>

There are no problems on this page, go to the next one.

# 1. Independence

You shuffle a standard deck of cards so that all 52 cards are equally likely to be in any spot. You deal out a 5 card hand (recall that order doesn't matter for hands of cards), then (from the remaining 47 cards) deal out another 5 card hand.

Let  $A$  be the event "the first hand contains the King of Hearts."

Let  $C$  be the event "the first hand contains the 2 of clubs."

Let  $B$  be the event "the second hand contains the King of Hearts."

- (a) Are  $A$  and  $B$  independent? Fill in the appropriate circle **and** do an appropriate calculation to justify your answer. **Be sure to tell us what you're calculating with notation, e.g.,  $\mathbb{P}[X|Y]$ .** [5 points]

- $A$  and  $B$  are independent.
- $A$  and  $B$  are **not** independent (i.e., they are dependent).

- (b) Are  $B$  and  $C$  independent? You do not need to show us a calculation for this part. [2 points]

- $B$  and  $C$  are independent.
- $B$  and  $C$  are **not** independent (i.e., they are dependent).

- (c) What is the best description of  $A, B, C$  as a group? [2 points]

- $A, B, C$  are pairwise independent (but not mutually independent).
- $A, B, C$  are mutually independent.
- $A, B, C$  are neither mutually nor pairwise independent.

## 2. Registration Nightmare! [16 points]

You want a class for spring quarter, but since registration has passed, you need to pick up a spot from someone already in the class. Your friend Alice is thinking of dropping the class, which is both good and bad: you kind of want her seat, but you'd prefer to be in the class together.

Alice will drop the class with probability 0.4. You have enabled MyUW text notifications, so if Alice drops the class, you will get a seat with probability 0.9. If Alice does not drop the class, you can still get in by picking up another seat with probability 0.2.

We define the following events:

- $C$  is the event you get in the class.
- $D$  is the event that Alice drops the class.

**Remark:** You **DO NOT** need to simplify algebraic expressions (e.g. calculate a final answer). If you need to reference the answer from a previous part, use the variable defined in the header.

- (a) What is the probability you get in the class? Call this value  $a$ . [4 points]

- (b) Using the events defined above, what expression represents the probability that Alice drops the class, assuming that you get into the class? [2 points]

$$\mathbb{P}(\underline{\hspace{2cm}})$$

- (c) Calculate the value for the previous expression. Call this value  $c$ . [4 points]

- (d) Using the events defined above, what expression represents the probability that you get into the class **AND** Alice stays in the class? [2 points]

$$\mathbb{P}(\underline{\hspace{2cm}})$$

- (e) Calculate the value for the previous expression. [4 points]