⚠ This quiz has been regraded; your score was not affected.

Homework 0 Part A

Due Sep 2 at 9am **Points** 15 **Questions** 16 **Available** after Aug 29 at 12am **Time Limit** None

Instructions

This quiz on pre-requisite background is the first part of Homework 0. You must achieve a passing grade in order to continue in the course.

Attempt History

	Attempt	Time	Score	Regraded
LATEST	Attempt 1	5087 minutes	15 out of 15 *	15 out of 15 *

* Some questions not yet graded

⚠ Correct answers are hidden.

Score for this quiz: **15** out of 15 *
Submitted Sep 2 at 2:21am
This attempt took 5087 minutes.

Probability and Statistics: Distributions

Question 1 **1 / 1 pts**

Which of the following statements is true for the probability density function (pdf), f_X, of a continuous random variable, X, of one real-value? (Select all that applies)

- The range of f_X is $[0, 1)$
- The range of f_X is $(-\infty, \infty)$
- ◉ $\int_{-\infty}^{\infty} f_X(x)dx = 1$

- [ ] The domain of f_X is $[0, 1]$

Question 2

1 / 1 pts

Which of the following statements is true for the cumulative distribution function (cdf), F_X, of a continuous random variable, X, of one real-value? (Select all that apply)

- [x] The range of F_X is $[0, 1)$
- [ ] The range of F_X is $(-\infty, \infty)$
- [ ] $\int_{-\infty}^{\infty} F_X(x)dx = 1$
- [x] $\int_{-\infty}^{a} f_X(x)dx = F_X(a)$, where f_X is the pdf of X
- [ ] The domain of F_X is $[0, 1]$

Question 3

1 / 1 pts

For a continuous random variable X, the statement $f_X(2) = 0.9$, where f_X is the pdf of X, means... (Select all that apply)

- [ ] the probability of $X = 2$ is 0.9
- [ ] the probability of $X \leq 2$ is 0.9
- [ ] the probability of $X = 2$ is very large, therefore we are very likely to observe X with a value of 2
- [x] none of the above

Question 4 **1 / 1 pts**

For a continuous random variable X, the statement $F_X(2) = 0.9$, where F_X is the cdf of X, means... (Select all that apply)

- [ ] the probability of $X = 2$ is 0.9
- [x] the probability of $X \leq 2$ is 0.9
- [ ] the probability of $X = 2$ is very small, therefore we are unlikely to observe X with a value of 2
- [ ] the probability of $X = 2$ is very large, therefore we are very likely to observe X with a value of 2
- [ ] none of the above

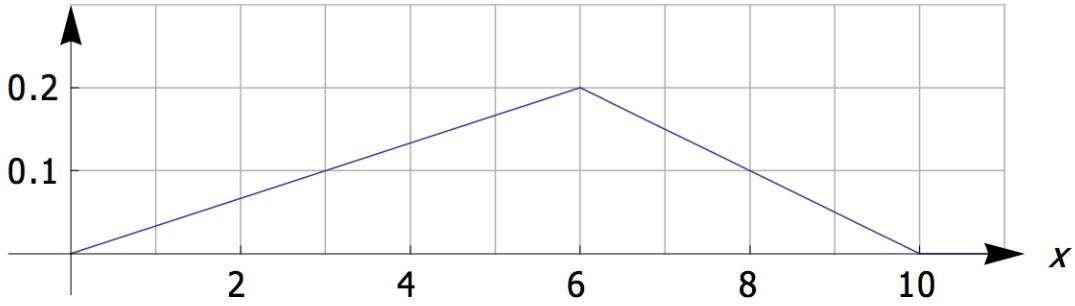
Question 5 **1 / 1 pts**

For a discrete random variable X, the statement $p_X(2) = 0.9$, where p_X is the probability mass function of X, means... (Select all that apply)

- [x] the probability of $X = 2$ is 0.9
- [ ] the probability of $X <= 2$ is 0.9
- [ ] the probability of $X = 2$ is very small, therefore we are unlikely to observe X with a value of 2
- [x] the probability of $X = 2$ is very large, therefore we are very likely to observe X with a value of 2
- [ ] none of the above

Probability and Statistics: Descriptive Statistics

The following is the pdf of a continuous random variable, X,



Use the above graph to compute the following.

Question 6

1 / 1 pts

The mean of X is

- $\frac{16}{3}$
- 6
- 5
- $\sqrt{30}$
- $\frac{22}{3}$

Question 7

1 / 1 pts

The median of X is

- $\frac{16}{3}$

- 6
- 5
- $\sqrt{30}$
- $\frac{22}{3}$

Question 8 **1 / 1 pts**

The variance of X is

- $\frac{258}{3}$
- 45
- 10
- 30
- $\frac{98}{3}$

Question 9 **1 / 1 pts**

The mode of X is:

- $\frac{16}{3}$
- 6
- 5
- $\sqrt{30}$

- $\frac{22}{3}$

Question 10 **1 / 1 pts**

Suppose you're told that: "most of the single family homes in Worcester tend to be priced around $150,000; although there are a significant number of listings ranging above $150,000 into the million mark." In this case, it's reasonable to expect that:

- the median price of single family homes in Worcester is higher than the mean
- **the mean price of single family homes in Worcester is higher than the median**
- the mean and the median of single family homes in Worcester are equal
- there is insufficient information to make a statement about the mean and/or median

Joint, Conditional and Marginal Probabilities

Suppose you have the following information regarding the FDA trials of an experimental Hep-C test:

- 80% of the participants were Hep-C positive
- 20% of the participants were Hep-C negative and were used as control
- 95% of the Hep-C patients tested positive
- 30% of the control patients tested positive

Let H the patient's actual Hep-C status and let T be the patient's test status. Compute the following probabilities. Please explain your reasoning and state all formulae, properties you use.

Question 11 **1 / 1 pts**

$P(T = +|H = +)$

- $0.8 \cdot 0.95$

- $\frac{0.8 \cdot 0.95}{0.95 \cdot 0.3}$
- $0.8 \cdot 0.3$
- $0.8 \cdot 0.95 + 0.2 \cdot 0.3$
- $0.95 \cdot 0.3$
- (•) 0.95
- $\frac{0.8 \cdot 0.8 \cdot 0.95}{0.8 \cdot 0.95 + 0.2 \cdot 0.3}$
- $0.8 \cdot 0.8 \cdot 0.95$

Question 12 **1 / 1 pts**

$P(T = +, H = +)$

- (•) $0.8 \cdot 0.95$
- $\frac{0.8 \cdot 0.95}{0.95 \cdot 0.3}$
- $0.8 \cdot 0.3$
- $0.8 \cdot 0.95 + 0.2 \cdot 0.3$
- $0.95 \cdot 0.3$
- 0.95
- $\frac{0.8 \cdot 0.8 \cdot 0.95}{0.8 \cdot 0.95 + 0.2 \cdot 0.3}$
- $0.8 \cdot 0.8 \cdot 0.95$

Question 13 1 / 1 pts

$P(T = +)$

- $0.8 \cdot 0.95$
- $\frac{0.8 \cdot 0.95}{0.95 \cdot 0.3}$
- $0.8 \cdot 0.3$
- **$0.8 \cdot 0.95 + 0.2 \cdot 0.3$**
- $0.95 \cdot 0.3$
- 0.95
- $\frac{0.8 \cdot 0.8 \cdot 0.95}{0.8 \cdot 0.95 + 0.2 \cdot 0.3}$
- $0.8 \cdot 0.8 \cdot 0.95$

Question 14 1 / 1 pts

$P(H = +|T = +)$

- $0.8 \cdot 0.95$
- $\frac{0.8 \cdot 0.95}{0.95 \cdot 0.3}$
- $0.8 \cdot 0.3$
- $0.8 \cdot 0.95 + 0.2 \cdot 0.3$
- $0.95 \cdot 0.3$
- 0.95

- (•) $\frac{0.8 \cdot 0.8 \cdot 0.95}{0.8 \cdot 0.95 + 0.2 \cdot 0.3}$
- ( ) $0.8 \cdot 0.8 \cdot 0.95$

Incorrect

Question 15

Original Score: 1 / 1 pts **Regraded Score: 1 / 1 pts**

⚠ **This question has been regraded.**

In order to win FDA approval for commercial use, the Hep-C test must be 80% effective in indicating the existence of an Hep-C infection. Does the above experimental Hep-C test meet the standard for commercial usage?

- ( ) Yes
- (•) No
- ( ) There is insufficient information to make this determination

Question 16

Not yet graded / 1 pts

Suppose you are given a 2 by n table of US infant birth weight data, stored as a 2-dimensional array. The first column is the age of the mother at the time of birth and the second column is the birth weight of the infant.

Write a single function, in your language of choice, that takes as input:

1. the birth weight table

2. the number of rows in the table

3. a number min and a number max (in this order);

that then returns:

1. the average,

2. the median

3. the mode of the ages of the mothers whose infant has birth weight between min lbs and max lbs.

Do not use any pre-defined or built-in functions (e.g. sort, filter, mean etc).

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Quiz Score: **15** out of 15