

Mathematics 1550H – Introduction to probability

TRENT UNIVERSITY, Winter 2016

Quizzes

Quiz #1. Friday, 15 January, 2016. [15 minutes]

A fair four-sided die has its faces marked with the numbers 1, 2, 3, and 4, respectively. Since the die is fair, any of these numbers is as likely to be rolled as any other. The die is rolled twice.

1. What is the sample space Ω for this experiment? How many outcomes are there in Ω ? [2]

Find the probability that

2. ... both rolls gave an odd number. [1]
3. ... at least one of the rolls gave an even number. [1]
4. ... one of the rolls gave an even number and the other gave an odd number? [1]

Quiz #2. Friday, 22 January, 2016. [12 minutes]

A fair coin is tossed twice. If the two tosses came up with different faces, that's it; otherwise, if the two tosses came up with the same face, the coin is tossed two more times.

1. Draw the complete tree diagram for this experiment. [1.5]
2. What is the probability that at least two tosses in a row came up the same way during the experiment? [1]
3. What is the probability that exactly three tosses, not necessarily in a row, came up the same way during the experiment? [1]
4. What would the sample space and probability function be if the coin were tossed until five tosses had been made or the coin came up with whatever face appeared on the first toss again, whichever came first? [1.5]

Quiz #3. Friday, 29 January, 2016. [10 minutes]

Suppose that the continuous random variable X has the probability density function:

$$f(t) = \begin{cases} 1+t & -1 \leq t \leq 0 \\ 1-t & 0 \leq t \leq 1 \\ 0 & t < -1 \text{ or } t > 1 \end{cases}$$

1. Graph $f(t)$. [1]
2. Verify that $f(t)$ is indeed a probability density function. [2]
3. Compute $P(X \geq \frac{1}{2})$. [2]

Quiz #4. Friday, 5 February, 2016. [10 minutes]

1. How many distinct ways are there to take all the letters, including the repetitions, in the word "Mississauga" and arrange them in a row? [5]

Quiz #5. Friday, 12 February, 2016. [12 minutes]

A fair coin is tossed six times. Let A be the event that the number of heads that came up is odd, and let B be the event that the number of heads that came up is greater than two.

1. Compute $P(A|B)$. [5]

Quiz #6. Friday, 4 March, 2016. [15 minutes]

1. Suppose the continuous random variable H has density function $h(t) = \begin{cases} t^{-2} & 1 \leq t \\ 0 & t < 1 \end{cases}$. Let A be the event that $H \leq 2$ and B be the event that $\frac{4}{3} \leq H \leq 4$. Determine whether A and B are independent. [5]

Take-Home Quiz # π^φ . Due on Monday, 7 March, 2016.

What is a haiku?

seventeen in three:
five and seven and five of
syllables in lines

1. Write a haiku touching on probability. [5]

Quiz #7. Friday, 11 March, 2016. [10 minutes]

1. Suppose a non-standard fair six-sided die has faces numbered 1, 3, 4, 5, 7, and 8, respectively. What is the expected value of the of the number that comes up if the die is rolled once? [5]

Quiz #8. Friday, 18 March, 2016. [10 minutes]

A fair coin is tossed until the second head comes up.

1. What is the probability that at most four tosses are required? [3]
2. What are the expected value and variance of the number of tosses required? [2]

Quiz #9. Friday, 1 April, 2016. [10 minutes]

The continuous random variable X has a normal distribution with expected value $\mu = 3$ and variance $\sigma^2 = 4$.

1. Use a table for the standard normal distribution to approximate $P(1 \leq X \leq 6)$. [2.5]
2. Use Chebyshev's Inequality to estimate $P(1 \leq X \leq 6)$. [2.5]