Mathematics 1550H – Introduction to probability

TRENT UNIVERSITY, Winter 2018

MATH 1550H Test #1

Friday, 9 February

Time: 50 minutes

Instructions

- *Show all your work.* Legibly, please!
- *If you have a question, ask it!*
- Use the back sides of the test sheets for rough work or extra space.
- You may use a calculator and an aid sheet.

1. Do any *two (2)* of **a**–**c**. *[10 = 2 × 5 each]*

a. A fair coin is tossed five times. What is the probability that at least four tails will come up?

b. Compute $P(X \geq 1)$ if the random variable X has the probability density function

$$f(x) = \begin{cases} \frac{1}{2}(1-x) & -1 \leq x \leq 1 \\ 0 & x < -1 \text{ or } x > 1 \end{cases}.$$

c. Suppose that A and B are events in some sample space, with $P(A) = P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{2}{3}$. What is $P(A \cap B)$?

2. Do any *two (2)* of **a**–**c**. *[10 = 2 × 5 each]*

a. A fair coin is tossed, and then tossed some more until it comes up with the face other than the one that came up on the first toss. What are the sample space and probability function for this experiment?

b. A hand of five cards is drawn randomly and simultaneously from a standard 52-card deck. How many such hands have three ♠s and two ♢s?

c. A fair coin is tossed until it comes up heads. Let A be the event that at least 5 tosses are required, and let B be the event that at least 3 tosses are required. Compute $P(A|B)$.

3. Do *one (1)* of **a** or **b**. *[10]*

a. If you were to pick an answer to this question at random from among the choices below, what is the probability that it would be correct? Explain your answer!

(1) 0.2 (2) $1/\pi$ (3) 1/5 (4) 0.0 (5) 4/10

b. What is the probability that a six was rolled exactly once in three rolls of a fair standard die, given that you know that a five was rolled exactly once?

[Total = 30]