# Mathematics 1550H – Introduction to probability
Trent University, Summer 2016

*Monday, 11 July, 2016*
*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 *three (3)* of **a**–**d**. *[12 = 3 × 4 each]*

**a.** A fair coin is tossed ten times. What is the probability that at least two heads occur?

**b.** A hand of five cards is randomly drawn, without order or replacement, from a standard deck. What is the probability that you got exactly three of one kind and one of each of two other kinds in the hand?

**c.** Determine whether $f(t) = \begin{cases} 2e^{2t} & -\infty < t \leq 0 \\ 0 & \text{otherwise} \end{cases}$ is a probability density function.

**d.** A fair three-sided die with faces numbered 1 through 3 is rolled twice. What is the probability that the sum of the two rolls is even, given that the first roll was odd?

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

**a.** A baby's toy has four holes, numbered 1 through 4, and four balls, also numbered 1 through 4. If the baby randomly puts a ball into each hole, what is the probability that at least one ball ends up in a hole with the same number?

**b.** A fair coin is tossed: if it come up heads, a fair standard die is rolled once, but if the coin comes up tails, a fair four-sided die with faces numbered 1 through 4 is rolled once instead. Draw the complete tree diagram for this experiment and determine the probability that the die roll gives a number that is at least 3.

**c.** Suppose $A$ and $B$ are independent events in a sample space $\Omega$. Verify that $A$ and $\overline{B}$ are also independent.

**3.** Do any *one (1)* of **a** or **b**. *[8 = 1 × 8 each]*

**a.** Given the density function $g(t) = \begin{cases} t^{-2} & 1 \leq t < \infty \\ 0 & t < 1 \end{cases}$ , let $A = [0, 2]$ and $B = [1, 3]$ be events. Compute $P(A|B)$.

**b.** A five-card hand is randomly drawn, without order or replacement, from a standard deck. What is the probability that at least three of the cards in the hand are from the same suit?

*[Total = 30]*