

# MTH4107 Introduction to Probability – 2010/11

## Feedback on the end-term test

**General Comments** The average mark on the test was 58. The pass mark is 40. The range of marks went from 0 to 98.

Many students made no attempt to explain what they were doing in their calculations for questions 1, 2 and 4. This meant that they either got full marks for the correct answer or zero marks for the wrong answer. Students who did explain what they were doing (and their explanation made sense) obtained partial marks even if they got the wrong answer. Students who simply wrote down the answer without any calculations received only a small proportion of the marks.

**Q1(a)** When you state a theorem you need to give the hypotheses and write in sentences (as well as stating the conclusion). Students who just gave the conclusion  $\mathbb{P}(A|B) = \mathbb{P}(B|A)\mathbb{P}(A)/\mathbb{P}(B)$  received only half marks.

**Q1(b)** This is an application of the Theorem of Total Probability.

**Q1(c)** This is an application of Bayes' Theorem.

**Q2(b)** Many students calculated the probability mass function of  $X$  incorrectly. I think because they did not read the question carefully and instead assumed that it must be the same or similar to an example they had seen before. The calculation is straightforward once you have understood what the event ' $X = r$ ' means. For example the event ' $X = 1$ ' is the event that the maximum label on the two balls is 1, so it is the event  $\{(0, 0), (0, 1), (1, 0), (1, 1)\}$ . The moral is that you should take care to read the question carefully and make sure you understand it before starting your solution.

**Q3(a)** When you describe a practical situation in which this distribution occurs you are expected to say what  $\lambda$  and  $X$  mean in your example. Students who did not do this received only partial marks.

**Q4(a)** Quite a lot of students could not calculate the probability mass functions of  $X$  and  $Y$  from the joint probability mass function. This is straightforward - you just take the row and column sums in the table for the joint probability mass function.