

BB 101 Tutorial – 4

General comment: This week, all are quiz questions; there are 4 questions, one mark each; answers to these questions will be discussed in the tutorial class.

Quiz question.

This is a question paper combining quiz 4 (2 marks) and quiz 5 (2 marks). Please write the answer on an A4 sheet and submit it at the beginning of the tutorial class. Ensure your Roll number and name are on the A4 sheet. You have to prepare the answer before coming to the class.

In the lecture we saw that ideas from basic statistics is necessary for understanding biological data. We will consider a few examples

1. Analysing the data of cancer patients, one of the doctors — Dr. Alfred Knudson — did a seminal study named “*Mutation and cancer: Statistical study of Retinoblastoma*” (cancer in eyes). Cancer is a result of genetic mutations. If a person has certain inherited mutations, there is a high chance that the person will get cancer. Imagine such patients (with inherited mutations) visiting a doctor.
 - (a) Consider a tissue and assume that tumour growth happens at different random locations in the tissue. What is the probability ($P(r, m)$) that you will find such a patient with exactly r tumours if the average number of tumours is m ? (1 Mark)
 - (b) What is the probability that the you will find a patient with at least 1 tumour if the average number of tumour is m ? (1 Mark)
 - (c) Plot $P(r, m)$ versus r for $m=3$. (1 Mark)
 - (d) If the probability that the you will find a patient with at least 1 tumour = 95%, what is the average number of tumours (approximate it to the nearest integer)? (1 Mark)

(Dr. Knudson analysed his data this way)

First two questions are quiz 4 and the last two questions are quiz 5.