

Lab Exercise 7 (Probability Distributions)

IT2110 - Probability & Statistics

Week 09

Use R to find the probabilities in the following questions.

- 1) A company claims that their drug treatment cures 92% of cases of hookworm in children. Suppose that 44 children suffering from hookworm are to be treated with this drug and that the children are regarded as a simple random sample taken from a large population of children suffering from hookworm. Let X denote the number of children cured from a sample of 44 children.
 - i. What is the distribution of X ?
 - ii. What is the probability that 40 children are cured?
 - iii. What is the probability that less than or equal to 35 children are cured?
 - iv. What is the probability that at least 38 children are cured?
 - v. What is the probability that between 40 and 42 (both inclusive) children are cured?
- 2) Data from the maternity ward in a certain hospital shows that there is a historical average of 4.5 babies born in this hospital every day.
 - i. What is the probability that 6 babies will be born in this hospital tomorrow?
 - ii. What about the probability of more than 6 babies being born?
- 3) The time (in hours) required to repair a machine is an exponential distributed random variable with parameter $\lambda=1/2$.
 - i. Find the probability that a repair time takes at most 3 hours.
 - ii. Find the probability that a repair time exceeds 4 hours.
 - iii. Find the probability that a repair time takes between 2 to 4 hours

- 4) Assume that human body temperatures are normally distributed with a mean of $36.8\text{ }^{\circ}\text{C}$ and a standard deviation of $0.4\text{ }^{\circ}\text{C}$.
- i. A hospital uses $37.9\text{ }^{\circ}\text{C}$ as the lowest temperature considered to be a fever. What is the probability that randomly selected person would have a fever?
 - ii. What is the probability that a random selected person would have a temperature between $36.4\text{ }^{\circ}\text{C}$ and $36.9\text{ }^{\circ}\text{C}$?
 - iii. Physicians want to select a maximum temperature for requiring further medical tests. What should that temperature be, if want only 1.2% of the people to fall below it?
 - iv. Physicians want to select a minimum temperature for requiring further medical tests. What should that temperature be, if want only 1.0% of the people to fall above it?