Assignment 2

Problem 1. The pdf of a discrete random variable X is given by,

$$p_k = p(1-p)^{k-1},\ k = 1, 2, \ldots.$$

Choose p as the inverse of the last two digit of your entry (roll) no. Plot the pdf and cdf using bar graph for $k = 1, 2, \ldots, 30$. Also find $P(X \leq 101)$ using the same p.

Problem 2. The pdf of t-distribution is given by:

$$p(t) = \frac{\Gamma(\frac{\nu+1}{2})}{\sqrt{\nu\pi}\,\Gamma(\frac{\nu}{2})}\left(1 + \frac{t^2}{\nu}\right)^{-\frac{\nu+1}{2}}, t \in \mathbb{R}$$

where $\nu \in \mathbb{N}$ is the number of degrees of freedom. Show using plot that the graph of pdf with more degrees of freedom are more like a pdf of $N(0, 1)$ distribution. Hint: Plot the pdf of t-distribution using 5 different ν values with the pdf of $N(0, 1)$.

Problem 3. Plot the joint cdf of a bivariate normal distribution.

Problem 4. Evaluate the following integral:

$$\int_{x=0}^{x=1}\int_{y=0}^{y=1-x}\int_{z=0}^{z=1-x-y}(5x - 3y)\,dz\,dy\,dx.$$

Problem 5. Determine a 95 percent and a 90 percent confidence interval for the average resting pulse of the members of a health club if a random selection of 15 members of the club yielded the data

$$54, 63, 58, 72, 49, 92, 70, 73, 69, 104, 48, 66, 80, 64, 77.$$

Instructions

- All questions are meant to solve solely in R.
- Submit exactly one '.r' file associated with each question (five in total).
- Use appropriate comments to describe the steps in the code. (Do not use more than 5 lines of comments for each question.)
- Each question contains 4 points.
- Those who are uploading from Mac, make sure there are no other hidden files.
- Do not discuss the solution with your friends; it increases the percentage of similarity. If found similar, both the copy will be entitled with zero points. Attaching a sample similarity report for your reference.