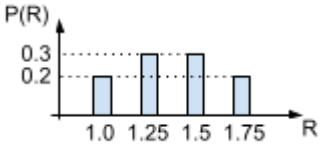
CENG 461 Artificial Intelligence
Homework 3

Due date: 07.01.2024

In a village, the fishers need to decide the optimal number of fish to catch, considering the current fish population at each annual fishing season. They try to maximize the harvest, keeping in mind that overfishing would decrease the yield the next year. The rate of growth, **R**, for the fish population, is a random variable that is used to estimate the population for the next year by multiplying the number of remaining fish with R and rounding it to the nearest integer. However, due to the limited resources of the lake, the fish population cannot exceed **M**.

Probability over R is distributed as the following:



Calculate the utility values of the states using value iteration and find the optimal policy (only for the first two iterations) with the discount factor = 0.9 and M = 10. Show your calculations clearly in a legible report and submit a single PDF file. Take initial utilities as 0.

Bonus:
Implement:

- value iteration with the initial utilities as 0 (+30 pts)
- modified policy iteration with the initial policy as 1 for all states (+50 pts)

to find the optimal policy for the same problem, but this time for M = 100.
Submit a single Python file that prints the utilities at each iteration and finally prints the optimal policy at the end of each algorithm.