Probability & Statistics for EECS: Homework #05

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Problem 1

1. As the treasure has equally probability to be in the realm from 1 to 9. Then we have that:

   (a) If treasure in realm 1, then we need to ask 1 questions.

   (b) If treasure in realm 2, then we need to ask 2 questions.

   (c) ...

   (d) If treasure in realm 9, then we need to ask 9 questions.

   Then we denote that event X_i is that treasure in realm i. Then we have that:

   $$P(X_i) = \frac{1}{9}.$$

   Then we denote that Y is the number of questions we need to ask. Then we have that:

   $$P(Y = k) = P(X_k) = \frac{1}{9}$$

   Then we have that:

   $$E(X_i) = 1 * \frac{1}{9} + 2 * \frac{1}{9} + ... + 9 * \frac{1}{9} = 5$$

2. By using the bisection method, as for cases that treasure in realm $\in [1, 5]$, will have probability of $\frac{5}{9}$ to continue find, as for realm $\in [6, 9]$, will have probability of $\frac{4}{9}$, to continue find. As for the first part, then

Problem 2

Problem 3

Problem 4

Problem 5