DATA 605 - Discussion 7

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Section 5.1, Exercise 7, Page 197

7. A die is rolled until the first time T that a six turns up

(a) What is the probability distribution for T?

Solution

Since we're looking for the first success, T is a geometric random variable, with a distribution (density) of $P(T = n) = p \cdot (1 - p)^{n-1} \qquad n = 1, 2, 3, 4, ...$

$P(T = n) = (\frac{1}{6}) \cdot (\frac{5}{6})^{n-1} \qquad n = 1, 2, 3, 4, ...$

(b) Find $P(T > 3)$

Solution

From Example 5.1, we find that $P(T > 3) = (1 - p)^3 = (\frac{5}{6})^3 = \frac{125}{216} \approx 0.58$.

(c) Find $P(T > 6|T > 3)$

Solution

Also from Example 5.1, we find that $P(T > 6|T > 3) = \frac{P(T>6)}{P(T>3)} = \frac{\frac{5}{6}^6}{\frac{5}{6}^3} = (\frac{5}{6})^3 = \frac{125}{216} \approx 0.58$.