

MATH 5010 – Quiz 5

Name:

Date:

2.25 A pair of dice is rolled until a sum of 4 or 10 is obtained and then the experiment stops.

1. What is the probability that the experiment ends directly after the n th roll?

Let $A_n = \{\text{experiment ends by rolling a 4 on the } n^{\text{th}} \text{ roll}\}$,
 $B_n = \{\text{experiment ends by rolling a 10 on the } n^{\text{th}} \text{ roll}\}$,

$$\text{Then } P(A_n \cup B_n) = \frac{(30)^{n-1} 6}{(36)^n}$$

2. What is the probability that 4 appears before 10?

$$P\left(\bigcup_{n=1}^{\infty} A_n\right) = \sum_{n=1}^{\infty} P(A_n) = \sum_{n=1}^{\infty} \frac{(30)^{n-1} 3}{36^n} = \frac{\frac{3}{36}}{1 - \frac{30}{36}} = \frac{\frac{3}{36}}{\left(\frac{36-30}{36}\right)}$$

$$= \frac{3}{6} = \frac{1}{2}.$$