Example: You spin a wheel that has two colors on it, red & blue. The \( P(r) = 0.3 \), \( P(b) = 0.7 \)

Calculate the probability of getting exactly 2 reds in 3 spins of the wheel.

Solution

<table>
<thead>
<tr>
<th>Spin 1</th>
<th>Spin 2</th>
<th>Spin 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.3</td>
<td>0.027 (rrr)</td>
</tr>
<tr>
<td>0.7</td>
<td>0.7</td>
<td>0.063 (rrb) *</td>
</tr>
</tbody>
</table>

\[ P( \text{2 reds in 3 rolls}) = 0.063 + 0.063 + 0.063 \]
\[ = 0.189 \]

Binomial distribution

\[ P(x \text{ success in } n \text{ independent trials}) \]
\[ = P(x) = \binom{n}{x} p^x (1-p)^{n-x} \]
Example above:

$X$ is # of success = 2
$n$ is # of trials = 3
$p = 0.3$
$1 - p = 0.7$

$$P(2 \text{ reds}) = \binom{3}{2} (0.3)^2 (0.7)^{3-2}$$

$3 \text{ nCr } 2 = 3 (0.09)(0.7) = 0.189$

Example: Determine the probability of rolling exactly 4 sixes when you roll a die 10 times.

Solution:

$$= \binom{10}{4} \left( \frac{1}{6} \right)^4 \left( \frac{5}{6} \right)^6$$

$$= 0.056$$

p.539 #2 abcd