

<p>1. A fair die is rolled and the uppermost number is recorded. Label each of the following as an <i>outcome</i>, an <i>event</i> or a <i>random variable</i> of the probability experiment.</p> <p>Number of even numbers Six Even number</p>	<p>2. Two fair dice are rolled and the uppermost numbers are recorded. Define random variable X as the sum of the uppermost numbers. Set up a table to show the probability distribution of X.</p>																																														
<p>3. Refer to Q2. Find (a) $\Pr(X > 3)$ and (b) $\Pr(X < 10 X > 3)$.</p>	<p>4. Refer to Q3. Explain why the two events $X > 3$ and $X < 10$ are not independent.</p>																																														
<p>5. A fair coin is tossed four times and the result (H or T) of each toss is recorded. Define random variable X as the difference between the number of heads and the number of tails. Set up a table to show the probability distribution of X.</p>	<p>6. Random variable X has the probability distribution shown in the following table.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">-1.5</td> <td style="padding: 5px;">-1.2</td> <td style="padding: 5px;">1.3</td> <td style="padding: 5px;">4.1</td> </tr> <tr> <td style="padding: 5px;">$\Pr(X = x)$</td> <td style="padding: 5px;">0.31</td> <td style="padding: 5px;">0.22</td> <td style="padding: 5px;">0.4</td> <td style="padding: 5px;">0.07</td> </tr> </table> <p>Find (a) $\Pr(X < 1.3)$, (b) $\Pr(X > -1)$ and (c) $\Pr(-2 < X < 2)$.</p>	x	-1.5	-1.2	1.3	4.1	$\Pr(X = x)$	0.31	0.22	0.4	0.07																																				
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<p>7. Find the value(s) of k in the following probability distribution of X.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">1/3</td> <td style="padding: 5px;">2/3</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">4/3</td> <td style="padding: 5px;">5/3</td> <td style="padding: 5px;">2</td> </tr> <tr> <td style="padding: 5px;">$\Pr(X = x)$</td> <td style="padding: 5px;">k^2</td> <td style="padding: 5px;">$2k^2$</td> <td style="padding: 5px;">$3k^2$</td> <td style="padding: 5px;">$4k^2$</td> <td style="padding: 5px;">$5k^2$</td> <td style="padding: 5px;">k^2</td> </tr> </table>	x	1/3	2/3	1	4/3	5/3	2	$\Pr(X = x)$	k^2	$2k^2$	$3k^2$	$4k^2$	$5k^2$	k^2	<p>8. Give two reasons why the following cannot be a probability distribution.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">1.2</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">-2</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="padding: 5px;">$\Pr(X = x)$</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">0.1</td> <td style="padding: 5px;">0.3</td> <td style="padding: 5px;">0.2</td> <td style="padding: 5px;">0.4</td> <td style="padding: 5px;">0.1</td> </tr> </table>	x	3	1.2	0	3	-2	5	$\Pr(X = x)$	0	0.1	0.3	0.2	0.4	0.1																		
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<p>9. The rule of the probability distribution of discrete random variable X is $\Pr(X = x) = ax^2 + 0.5$, where $x = -2, 1, 4$. Find the value of a.</p>	<p>10. Refer to Q9. Display the probability distribution of X graphically.</p>																																														
<p>11. A die is biased with $\Pr(1) = \Pr(2) = \Pr(3) = \frac{2}{9}$ and $\Pr(4) = \Pr(5) = \Pr(6) = \frac{1}{9}$. It is rolled two times and the uppermost numbers are recorded. Tabulate the probability distribution of random variable X defined as the difference between the uppermost numbers.</p>	<p>Numerical, algebraic and worded answers.</p> <p>1. random variable, outcome, event 2.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">9</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">11</td> <td style="padding: 5px;">12</td> </tr> <tr> <td style="padding: 5px;">$\Pr(X=x)$</td> <td style="padding: 5px;">1/36</td> <td style="padding: 5px;">2/36</td> <td style="padding: 5px;">3/36</td> <td style="padding: 5px;">4/36</td> <td style="padding: 5px;">5/36</td> <td style="padding: 5px;">6/36</td> <td style="padding: 5px;">5/36</td> <td style="padding: 5px;">4/36</td> <td style="padding: 5px;">3/36</td> <td style="padding: 5px;">2/36</td> <td style="padding: 5px;">1/36</td> </tr> </table> <p>3. (a) 11/12 (b) 9/11 4. $\Pr(X > 3 \cap X < 10) \neq \Pr(X > 3) \times \Pr(X < 10)$ 5.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">4</td> </tr> <tr> <td style="padding: 5px;">$\Pr(X=x)$</td> <td style="padding: 5px;">3/8</td> <td style="padding: 5px;">1/2</td> <td style="padding: 5px;">1/8</td> </tr> </table> <p>6. (a) 0.53 (b) 0.47 (c) 0.93 7. 1/4 8. sum of pr > 1, 2 different probabilities for the same value of x 9. -1/42 11.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="padding: 5px;">$\Pr(X=x)$</td> <td style="padding: 5px;">15/81</td> <td style="padding: 5px;">24/81</td> <td style="padding: 5px;">18/81</td> <td style="padding: 5px;">12/81</td> <td style="padding: 5px;">8/81</td> <td style="padding: 5px;">4/81</td> </tr> </table>	x	2	3	4	5	6	7	8	9	10	11	12	$\Pr(X=x)$	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36	x	0	2	4	$\Pr(X=x)$	3/8	1/2	1/8	x	0	1	2	3	4	5	$\Pr(X=x)$	15/81	24/81	18/81	12/81	8/81	4/81
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