

## Interval and Binomial Problems Additional Exercises

Write the following in symbolic form using  $x$  as the random variable. These are statements for discrete probability problems. (answers are below)

1. (a) exactly four  
(b) more than four  
(c) fewer than four  
(d) at least four  
(e) at most four  
(f) above four
2. (a) There are at least 10 flowers  
(b) There are no more than 7 cars  
(c) There are fewer than 8 voters  
(d) There are exactly 14 telephones  
(e) There are above 11 computers  
(f) There are zero homeless shelters
3. (a) The probability that at most 9 people voted is exactly .15  
(b) The probability that fewer than 8 gas stations are open is approximately .128  
(c) The probability that at least a dozen carpenters are working is close to three-quarters  
(d) The probability that no more than 10 children missed classes is .12  
(e) The probability that exactly 25 cars breakdown is approximately .25  
(f) The probability that fewer than 25 cars breakdown is exactly one-fifth
4. (a) Write the probability for flipping a head using  $x$  for the random variable of head and correct probability notation.  
(b) Write the probability for not flipping a head using  $x$  for the random variable of head and correct probability notation.

5. What is the probability of flipping a head at least 7 times in ten tries?

6. The average number of visitors to the information booth between 2:00 pm and 3:00 pm in the afternoon is 14. Assuming that visitors arrive randomly and with uniform probability, what is the probability of fewer than ten?

7. There is a 90% chance that Square Table Pizza will make a delivery in less than 30 minutes. An executive for Square Table decides to test the delivery system by ordering 20 pizzas at different times and different locations. If the 90% rate is correct, find the probability that more than one pizza will be delivered in 30 minutes or more.

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|---|--|---|
| <p>1. (a) <math>x = 4</math><br/>(b) <math>x &gt; 4</math> or <math>x \geq 5</math><br/>(c) <math>x &lt; 4</math> or <math>x \leq 3</math><br/>(d) <math>x \geq 4</math><br/>(e) <math>x \leq 4</math><br/>(f) <math>x &gt; 4</math> or <math>x \geq 5</math></p>   | <p>2. (a) <math>x \geq 10</math><br/>(b) <math>x \leq 7</math><br/>(c) <math>x &lt; 8</math> or <math>x \leq 7</math><br/>(d) <math>x = 14</math><br/>(e) <math>x &gt; 11</math> or <math>x \geq 12</math><br/>(f) <math>x = 0</math></p>  | <p>3. (a) <math>P(x \leq 9) = 0.15</math><br/>(b) <math>P(x &lt; 8) = P(x \leq 7) \approx 0.128</math><br/>(c) <math>P(x \geq 12) \approx 0.75</math><br/>(d) <math>P(x \leq 10) = 0.12</math><br/>(e) <math>P(x = 25) \approx 0.25</math><br/>(f) <math>P(x &lt; 25) = P(x \leq 24) = 0.2</math></p> |
| <p>4. (a) <math>P(x = 1) = 0.5</math><br/>(b) <math>P(x = 0) = 0.5</math></p>   | <p>5. <input checked="" type="checkbox"/> F <math>n = 10</math><br/> <input checked="" type="checkbox"/> I we assume<br/> <input checked="" type="checkbox"/> T "heads or tails"<br/> <input checked="" type="checkbox"/> Constant <math>p = 0.5</math>      This is binomial.<br/> <math>P(x \geq 7) = 1 - \text{binomcdf}(10, .5, 6) \approx 0.172</math></p>  |   |
| <p>6. F no fixed number<br/> <input checked="" type="checkbox"/> I we assume<br/> <input checked="" type="checkbox"/> T "arrives or doesn't arrive"<br/>         Constant "probability of visitor not given"</p> <p>This is NOT binomial. Key words here are average (or mean) and the 2:00 to 3:00 pm interval.<br/>         This is a poisson problem with <math>\mu = 14</math>.<br/> <math>P(x &lt; 10) = P(x \leq 9) = \text{poissoncdf}(14, 9) \approx 0.109</math></p> | <p>7. <input checked="" type="checkbox"/> F <math>n = 20</math><br/> <input checked="" type="checkbox"/> I we assume<br/> <input checked="" type="checkbox"/> T "late or on time"<br/> <input checked="" type="checkbox"/> Constant (prob. of late: <math>p = 0.10</math>)</p> <p>This is binomial.<br/> <math>P(x &gt; 1) =</math><br/> <math>P(x \geq 2) = 1 - \text{binomcdf}(20, .1, 1) \approx 0.608</math></p> |   |