The deer in Chautauqua spend each morning in one of three groves, but there doesn’t seem to be any pattern to where they'll be each day. When I take my dog out in the morning, he races into the trees, hoping to find deer. I wonder whether Rufus is guessing randomly which grove to run to, or whether he can smell or hear them from across the field. So, I write down whether he finds deer each day:

<table>
<thead>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Use these data to do a binomial test of whether Rufus can smell the deer or is just guessing.

1. What parameter are we trying to make a conclusion about? (Write the meaning of the parameter, not its mathematical symbol.)
   The probability he will find the deer on any given day

2. Write a sentence stating the null hypothesis at a conceptual level.
   He is guessing; his probability of finding deer is 1/3 every day.

3. Write the null hypothesis mathematically (i.e., as an equation).
   \( q = \frac{1}{3} \)

4. Write a sentence stating the alternative hypothesis at a conceptual level.
   He’s not just guessing; his probability of finding deer each day is different from (or greater than) 1/3.

5. Write the alternative hypothesis mathematically.
   \( q > \frac{1}{3} \) or \( q \neq \frac{1}{3} \)

6. What test statistic will you use to decide between the hypotheses?
   Frequency of finding deer, \( f(\text{Yes}) \)

7. What is the value of this statistic for the sample I recorded?
   9

Here’s the distribution for the test statistic you should have written for Question 6, according to the null hypothesis. This is a binomial distribution based on \( n = 14 \) and \( q \) equal to what you should have written above.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>.00</td>
<td>.02</td>
<td>.08</td>
<td>.16</td>
<td>.21</td>
<td>.21</td>
<td>.16</td>
<td>.09</td>
<td>.04</td>
<td>.01</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
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</tbody>
</table>

8. What is the critical value, assuming \( \alpha = 5\% \)?
   Between 7 and 8

9. Which hypothesis do the data support?
   Alternative hypothesis

10. Why?
    He found deer more often than we would expect if the null hypothesis were true

11. Write a sentence summarizing your conclusion. This should be a sentence about Rufus, not about statistics.
    Rufus can smell deer from across the field.