Test Your Understanding 12

Graph the dynamic modulus (stress/strain, measured in mega-pascals) of a set of asphalt samples using a density histogram, with the intervals indicated.

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>[48, 54)</td>
<td>36</td>
</tr>
<tr>
<td>[54, 57)</td>
<td>51</td>
</tr>
<tr>
<td>[57, 67)</td>
<td>30</td>
</tr>
</tbody>
</table>
Test Your Understanding 13

A population histogram has four bars. The first corresponds to measurement value 1 and has area 0.40, the second corresponds to measurement value 3 and has area 0.25, the third corresponds to measurement value 8 and has area 0.30, and the fourth corresponds to measurement value 12.

(a) What is the area of the fourth bar?

(b) 1000 measurements are sampled randomly from the population. How many do you expect will have the value 1? 3? 8? 12? Why?
Test Your Understanding 14

Experience has shown that the width, in mm, of the flange on a plastic connector has the following distribution:

\[ p_Y(y) = \begin{cases} 
50y, & 0.48 < y < 0.52, \\
0, & \text{otherwise} 
\end{cases} \]

1. Of the next 1000 connectors produced, how many do you estimate will have widths between 0.50 and 0.51 mm? Show how you arrived at your estimate.

2. How many times as likely is it to produce connectors with flange width close to 0.51 mm as it is to produce connectors with flange width close to 0.49 mm? Justify your answer.
Test Your Understanding 15

A department at a college has 10 professors whose ages in years are 28, 44, 51, 32, 39, 48, 61, 55, 64, and 30. A random sample of size 4 is taken from this population, and the ages of those selected are 28, 48, 64, and 30. Compute the population mean \( \mu \), and the sample mean \( \bar{y} \).
Test Your Understanding 16

Suppose we sample 4 OJ containers from the production lot having population proportion \( p \) of acceptable containers. Calculate \( P(T(3) = P(Y = 3) \), the probability of obtaining exactly 3 acceptable containers in the sample.
Test Your Understanding 17

A system consists of three identical components. The system can operate successfully only if at least two components are operating. The probability any one component lasts less than 100 hours is 0.06, and whether that component fails before 100 hours is independent of the performance of the other two components. If $Y$ is the number of components in the system that fail before 100 hours,

(a) Obtain the distribution model of $Y$.

(b) What is the probability the system fails before 100 hours?
Test Your Understanding 18

Suppose the population of math SAT scores follows a normal distribution with mean 500 and standard deviation 80. What proportion of students get between 600 and 700 on the exam?
Test Your Understanding 19

In Example 4.5, if 100 cereal boxes are used to compute the mean find the probability the estimate is within 0.1 ounces of the true mean weight.
Test Your Understanding 20

The state bar exam is designed so that 30% of prospective lawyers pass it each year, and over time, this passing percentage has held true, on average. From one year to the next, however, the percentage can vary. If 1000 prospective lawyers take the exam this year, and assuming each lawyer has a 0.30 probability of passing, approximately what is the probability that 320 or more pass?
Test Your Understanding 21

The following are the numbers of cycles to failure of 30 electrical appliances in a life test. The data are ordered for your convenience.

\[
\begin{array}{cccccccccccc}
14 & 59 & 69 & 123 & 165 & 381 & 479 & 574 & 917 & 991 \\
1088 & 1174 & 1275 & 1397 & 1578 & 1702 & 1932 & 2161 & 2326 & 2628 \\
2811 & 2993 & 3122 & 3715 & 3857 & 4100 & 4116 & 4510 & 5267 & 5583 \\
\end{array}
\]

The mean and standard deviation of the data are 2036.9 and 1646.7, respectively. Use the 68-95-99.7 rule to assess normality.
Test Your Understanding 22

Fill in the remainder of the table and create the normal quantile plot. Remember the data are 266, 149, 161, 220.

<table>
<thead>
<tr>
<th>k</th>
<th>((k - 0.375)/(n + 0.250))</th>
<th>(q(k))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.147</td>
<td>-1.05</td>
</tr>
<tr>
<td>2</td>
<td>0.382</td>
<td>-0.30</td>
</tr>
<tr>
<td>3</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>4</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
From Test2, A ’01:

1. Newly-picked oranges are sorted into four classifications, which we will label 1 (highest) through 4 (lowest). Let the random variable $Y$ denote the classification of a randomly selected orange. Experience shows that $Y$ has probability distribution $p_Y(y) = c/y, \ y = 1, 2, 3, 4$.

(a) Find the value of $c$.

(b) Sketch the population histogram of this random variable.

(c) Use the information from (a) to estimate how many of the next 10,000 oranges harvested will be given one of the top two classifications.
2. Diameter specifications for mylar sheaths produced by the Ebco Company are $15 \pm 2$ mm. Measurements taken from a large number of production units suggest the diameters $Y$ of the population of sheaths follow a normal distribution with mean 15.1 and standard deviation 0.9.

(a) What is the population proportion of sheaths that fall within spec?

(b) The value of the $N(15.1, 0.9^2)$ density curve at 16.2 is one half its value at 15.1. Relate this fact to the relative likelihood of finding a sheath with a diameter close to 15.1 compared with finding one with diameter close to 16.2.