EX: A company manufacturing inexpensive analog function generators measures the frequency they produce when set to 1 kHz. They measure the following values in Hz:

\[
\begin{align*}
  f_1 &= 998 &  f_2 &= 997 &  f_3 &= 1003 &  f_4 &= 1001 &  f_5 &= 999 &  f_6 &= 1001 \\
  f_7 &= 998 &  f_8 &= 1002 &  f_9 &= 1000 &  f_{10} &= 1001 &  f_{11} &= 1000
\end{align*}
\]

Make a quantile plot of the data.

SOL’N: The quantile plot shows what fraction of data values are less than a given data value. After the data are ordered from lowest to highest, the values are assigned sequential numbers, \( i \):

\[
\begin{align*}
  997, & \quad 998, 998, \quad 999, \quad 1000, 1000, \quad 1001, 1001, \quad 1001, 1002, \quad 1003 \\
  i = 1 & \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11
\end{align*}
\]

Given the total number of data points, \( n = 11 \), we use the following formula that produces the quantile value, \( q \):

\[
q_i = \frac{i - 3}{8} \times \frac{1}{n + \frac{1}{4}}
\]

The offsets in the numerator and denominator are adjustments for the use of discrete integer values. Note that if \( i = 1 \) and \( n = 1 \), the quantile would be 5/8 over 5/4, implying that half the data is less than the single data point.

Quantile Plot of Function Generator Frequencies