

Solution to Problem 21

Task. If we have $\mu(1) = 0.2$ and $\mu(2) = 0.8$, what value shall we assign to $\mu(1.7)$? Use linear interpolation.

Solution. If we know the value $y_1 = f(x_1)$ and the value $y_2 = f(x_2)$, then linear interpolation means estimating $f(x)$ as

$$f(x) = y_1 + \frac{y_2 - y_1}{x_2 - x_1} \cdot (x - x_1).$$

In our case, $x_1 = 1$, $y_1 = 0.2$, $x_2 = 2$, $y_2 = 0.8$, and $x = 1.7$. So, we get

$$\begin{aligned}\mu(1.7) &= 0.2 + \frac{0.8 - 0.2}{2 - 1} \cdot (1.7 - 1) = 0.2 + \frac{0.6}{1} \cdot 0.7 = 0.2 + 0.6 \cdot 0.7 = \\ &0.2 + 0.42 = 0.62.\end{aligned}$$