

## 1. Aufgabe

$$f(x) = \lambda \cdot e^{-\lambda \cdot x}$$

$$\mu = \sigma = \frac{1}{\lambda}$$

$$P(0 \leq X \leq b) = \int_0^b \lambda \cdot e^{-\lambda \cdot x} dx = 1 - e^{-\lambda \cdot b}$$

a)

$$P(X < 2) = \int_0^2 \lambda \cdot e^{-\lambda \cdot x} dx$$

$$P(X < 2) = \int_0^2 0.25 \cdot e^{-0.25x} dx$$

$$P(X < 2) \approx 0.393469 \approx 39.34 \%$$

b)

$$P(X \geq 3) = \int_3^\infty 0.25 \cdot e^{-0.25x} dx$$

$$P(X \geq 3) \approx 47.23 \%$$

c)

$$P(1 \leq X < 4) = \int_1^4 0.25 \cdot e^{-0.25x} dx$$

$$P(1 \leq X < 4) \approx 41.09 \%$$

## 2. Aufgabe

a)

$$P(\mu - \sigma \leq X \leq \mu + \sigma)$$

$$\mu = 3$$

$$\sigma = 3$$

$$\mu = \frac{1}{\lambda}$$

$$3 = \frac{1}{\lambda}$$

$$\lambda = \frac{1}{3}$$

$$P(3 - 3 \leq X \leq 3 + 3) = \int_0^6 \frac{1}{3} \cdot e^{-\frac{1}{3}x} dx \approx 86.47 \%$$

b)

$$P(\mu - \sigma \leq X \leq \mu + \sigma)$$

$$\mu = 5$$

$$\sigma = 5$$

$$\mu = \frac{1}{\lambda}$$

$$5 = \frac{1}{\lambda}$$

$$\lambda = \frac{1}{5}$$

$$P(5 - 5 \leq X \leq 5 + 5) = \int_0^{10} \frac{1}{5} \cdot e^{-\frac{1}{5}x} dx \approx 86.47 \%$$

### 3. Aufgabe

a)

$$\mu = 10$$

$$P(X < 10) = \int_0^{10} \frac{1}{10} \cdot e^{-\frac{1}{10}x} dx$$

$$P(X < 10) \approx 63.21 \%$$

b)

$$P(X > 5) = \int_5^{\infty} \frac{1}{10} \cdot e^{-0.1x} dx$$

$$P(X > 5) \approx 60.65 \%$$

c)

$$P(5 \leq X \leq 15) = \int_5^{15} 0.1 \cdot e^{-0.1x} dx$$

$$P(5 \leq X \leq 15) \approx 38.34 \%$$

### 4. Aufgabe

a)

$$0.4 = \int_0^5 \lambda \cdot e^{-\lambda \cdot x} dx$$

$$\lambda = 0.102$$

$$f(x) = 0.102 \cdot e^{-0.102x}$$

b)

$$P(X \leq 10) = \int_0^{10} 0.102 \cdot e^{-0.102x} dx$$
$$P(X \leq 10) \approx 63.94 \%$$

c)

$$P(X > 10) = 1 - 0.6394 \approx 36.06 \%$$

## 5. Aufgabe

$$\mu = \frac{1}{0.08} = 12.5$$
$$0.5 = \int_{12.5-a}^{12.5+a} 0.08 \cdot e^{0.08x} dx$$
$$a \approx 1.14801$$