

**Task.** KP Cafeteria coffee is very popular. On average, it sold 10 cups of coffee per hour. Find the probability that exactly 12 cups of coffee were sold in 2 hours.

**Solution.** By assumption on average KP Cafeteria sells 10 cups of coffee per hour. Therefore it sells 20 cups per two hours.

Let  $Y$  be the number of cups of coffee sold in 2 hours. Then  $Y$  has Poisson distribution with  $\lambda = 20$ . Then the probability that  $Y = k$  is given by the formula:

$$P(Y = k) = \frac{\lambda^k}{k!} e^{-\lambda}.$$

We should compute  $P(Y = 12)$ . Substituting values into the latter formula we get:

$$P(Y = 12) = \frac{20^{12}}{20!} e^{-20} \approx \frac{4.096 * 10^{15}}{2.4329 * 10^{18}} * 2.0612 * 10^{-9} = 3.4702 * 10^{15-9-18} = 3.4702 * 10^{-12}.$$