

Zadatak 6. Riješi jednadžbe:

$$1) \frac{(n+2)!}{n!} = 72;$$

$$3) \frac{(k+1)!}{(k-1)!} = 30;$$

$$2) \frac{k!}{(k-4)!} = \frac{2k!}{(k-2)!};$$

$$4) \frac{n! - (n-1)!}{(n+1)!} = \frac{1}{6}.$$

Rješenje.

1)

$$\begin{aligned} \frac{(n+2)!}{n!} &= 72 \\ (n+2)(n+1) &= 72 \\ n^2 + 3n - 70 &= 0 \\ n_{1,2} &= \frac{-3 \pm \sqrt{9 + 4 \cdot 70}}{2} \quad n_{1,2} = \frac{-3 \pm 17}{2} \\ n_1 &= 7, \quad n_2 = -10 \end{aligned}$$

Jednadžbu zadovoljava prirodni broj $n = 7$.

2)

$$\begin{aligned} \frac{k!}{(k-4)!} &= \frac{2k!}{(k-2)!} \\ k(k-1)(k-2)(k-3) &= 2k(k-1) \\ (k-2)(k-3) &= 2 \end{aligned}$$

Jer je k prirodan, vidimo da mora biti $k-2 = 2$ pa je $k = 4$.

3)

$$\begin{aligned} \frac{(k+1)!}{(k-1)!} &= 30 \\ (k+1)k &= 30 \\ (k+1)k &= 6 \cdot 5 \\ k &= 5 \end{aligned}$$

4)

$$\begin{aligned} \frac{n! - (n-1)!}{(n+1)!} &= \frac{1}{6} \\ \frac{(n-1)!(n-1)}{(n-1)!n(n+1)} &= \frac{1}{6} \\ \frac{n-1}{n(n+1)} &= \frac{1}{6} \\ 6(n-1) &= n(n+1) \\ n^2 - 5n + 6 &= 0 \\ (n-2)(n-3) &= 0 \\ n_1 &= 2, \quad n_2 = 3 \end{aligned}$$

Jednadžbu zadovoljavaju obje vrijednosti.