What is 
\[ c_n = \sum_{k=n+1}^{\infty} \frac{k-1}{k!}? \]

**Extensions**

(1) Show that every rational \( x \) in (0,1) can be written as
\[ \sum_{k=2}^{\infty} \frac{y_k}{k!}, \]
with \( y_k \in \{0, 1, \ldots, k - 1\} \) for each \( k \), in exactly two ways: one in which all but finitely many of the \( y_k \)’s are 0 and the other in which all but finitely many of the \( y_k \)’s take the value \( k - 1 \).

(2) Show that \( e - 2 \) is not a rational number (and hence \( e \) is not rational).