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Proof Without Words: Sums of Reciprocals of Binomial Coefficients

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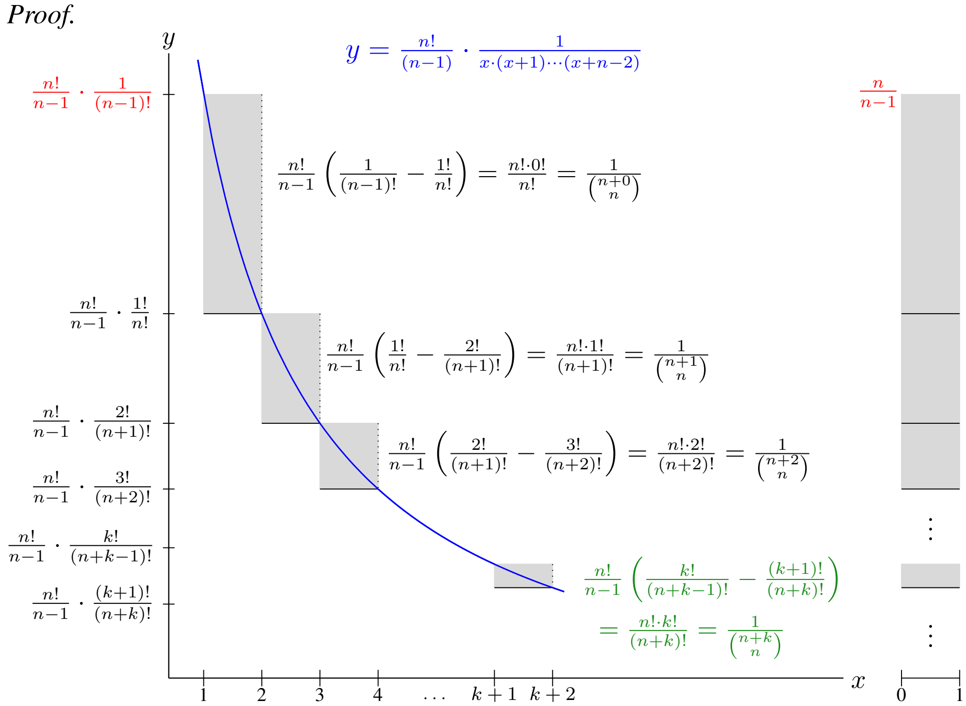
In what follows, the symbol $\binom{n+k}{n}$ is the binomial coefficient $\binom{n+k}{n} := \frac{(n+k)!}{n!\cdot k!}$.

Theorem. *Let* $n \geq 2$*. Then* $\displaystyle\sum_{k=0}^{\infty} \frac{1}{\binom{n+k}{n}} = \frac{1}{\binom{n+0}{n}} + \frac{1}{\binom{n+1}{n}} + \frac{1}{\binom{n+2}{n}} + \cdots = \frac{n}{n-1}.$

Proof.



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Summary We provide a visual computation of the sum of the series obtained by adding the reciprocals of entries in column n from Pascal's Triangle.