Exercise: 1

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2. Show that for the cumulative distribution function F(x) of the geometric distribution the following holds equation holds:

$$\sum_{i=1}^{x} p\,(1-p)^{i-1} = \; 1-(1-p)^{x}$$

Solution:

$$\sum_{i=1}^{x} p\,(1-p)^{i-1}$$

$= 1 - p\,(1-p)^{x} * [1 + (1-p) + (1-p)^2 + \ldots]$

$= 1 - p\,(1-p)^{x} * [\frac{1}{1-(1-p)}]$

$= 1 - (1-p)^{x}$