

Power series distribution (from <http://www.math.wm.edu/~leemis/chart/UDR/UDR.html>)

A power series random variable X has probability mass function

$$f(x) = \frac{a_x c^x}{A(c)} \quad x = 0, 1, 2, \dots$$

for $a_x > 0$, $c > 0$, and series function $A(c) = \sum a_x c^x$.

The cumulative distribution function on the support of X is

$$F(x) = P(X \leq x) = \sum_{w=0}^x \frac{a_w c^w}{A(c)} \quad x = 0, 1, 2, \dots$$

The survivor function on the support of X is

$$S(x) = P(X \geq x) = \sum_{w=x}^{\infty} \frac{a_w c^w}{A(c)} \quad x = 0, 1, 2, \dots$$

The hazard function on the support of X is

$$h(x) = \frac{f(x)}{S(x)} = \frac{a_x c^x}{\sum_{w=x}^{\infty} a_w c^w} \quad x = 0, 1, 2, \dots$$

The moment generating function of X is

$$M(t) = \frac{A(c e^t)}{A(c)} \quad t > 0.$$

The population mean of X is

$$E[X] = c \frac{d}{dc} [\ln A(c)].$$

The variance, skewness, and kurtosis of X are mathematically intractable.