Theorem The Poisson(μ) distribution is a special case of the power series($c, A(c)$)distribution when $c = \mu$ and $A(c) = e^c$.

Proof The power series($c, A(c)$) distribution has probability mass function

$$f(x) = \frac{a_x c^x}{A(c)} \qquad x = 0, 1, 2, \ldots .$$

When $c = \mu$, $A(c) = e^c$,

$$f(x) = \frac{a_x \mu^x}{e^\mu} \qquad x = 0, 1, 2, \ldots .$$

Setting $a_x = 1/x!$ we have

$$f(x) = \frac{\mu^x e^{-\mu}}{x!} \qquad x = 0, 1, 2, \ldots ,$$

which is the probability mass function of the Poisson(μ) distribution.

APPL verification: The APPL statements

```
assume(c > 0);
assume(a[x] > 0);
X := [[x -> a[x] * c ^ x / A(c)], [0, infinity], ["Discrete", "PDF"]];
A := c -> exp(c);
c := mu;
a[x] := 1 / x!;
simplify(X[1][1](x));
```

yield the probability mass function of the Poisson(μ) distribution.