Theorem The Rayleigh(α) distribution is a special case of the Weibull(α, β) distribution in which $\beta = 2$.

Proof Let the random variable X have the Weibull(α, β) distribution with probability density function

$$f(x) = (\beta/\alpha)x^{\beta-1}e^{-x^\beta/\alpha} \qquad x > 0.$$

When $\beta = 2$,

$$f(x) = (2x/\alpha)e^{-x^2/\alpha} \qquad x > 0.$$

which is the probability density function of the Rayleigh(α).

APPL verification: The APPL statements

```
assume(alpha > 0);
beta := 2;
X := WeibullRV(alpha, beta);
Y := RayleighRV(alpha);
```

yield identical the functional forms

$$f(x) = (2x/\alpha)e^{-x^2/\alpha} \qquad x > 0.$$

for the random variables X and Y, which verifies that the Rayleigh(α) distribution is a special case of the Weibull(α, β) distribution when $\beta = 2$.