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

**Proof** Let the random variable $X$ have the Weibull($\alpha, \beta$) distribution with probability density function

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

When $\beta = 2$,

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

which is the probability density function of the Rayleigh($\alpha$).

**APPL verification:** The APPL statements

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

yield identical the functional forms

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

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