

## Solution 2

Apply Taylor series (4.16):

$$s_z^2 = \left(\frac{\partial f}{\partial x}\right)^2 s_x^2$$

$$\frac{\partial f}{\partial x} = 2x \rightarrow s_z^2 = (2x)^2 s_x^2$$

$$z^2 = x^4 \rightarrow \left(\frac{s_z}{z}\right)^2 = \frac{4x^2 s_x^2}{x^4} \rightarrow \left(\frac{s_z}{z}\right)^2 = \frac{4s_x^2}{x^2} \rightarrow \frac{s_z}{z} = 2 \frac{s_x}{x}$$

Compare this result with the example on page 21 in the script about the multiplication of two factors. Adding the (equal) relative variances apparently contradicts the result above, as we here add the relative standard deviations.

Since the two factors are equal in our case, they are also fully correlated. If you set the correlation coefficient  $\rho = +1$ , you get the same result.