

**5.3** Compute the derivative  $f'(x)$  of the function

$$f(x) = \exp\left(-\frac{1}{2\sigma^2}(x - \mu)^2\right)$$

where  $\mu, \sigma \in \mathbb{R}$  are constants.

**Solution.**

Using Chain rule,

$$f'(x) = \frac{d(\exp(-\frac{1}{2\sigma^2}(x - \mu)^2))}{d(-\frac{1}{2\sigma^2}(x - \mu)^2)} * \frac{d(-\frac{1}{2\sigma^2}(x - \mu)^2)}{d(x - \mu)} * \frac{d(x - \mu)}{dx}$$

$$f'(x) = \exp\left(-\frac{1}{2\sigma^2}(x - \mu)^2\right) * \left(-\frac{1}{\sigma^2}(x - \mu)\right) * (1)$$

$$f'(x) = -\frac{(x - \mu)}{\sigma^2} \exp\left(-\frac{1}{2\sigma^2}(x - \mu)^2\right)$$