3.5.3

$$\begin{aligned} y &= x^2 \cos x; \\ \mathrm{d}y &= \mathrm{d}(x^2 \cos x) \\ &= \cos x \, \mathrm{d}(x^2) + x^2 \, \mathrm{d}(\cos x) \\ &= \cos x (2x \, \mathrm{d}x) + x^2(-\sin x \, \mathrm{d}x); \\ \frac{\mathrm{d}y}{\mathrm{d}x} &= 2x \cos x - x^2 \sin x. \end{aligned}$$

3.5.7 They mean to find $f'(x)$:

$$\begin{aligned} f(x) &= \sin x \tan x; \\ \mathrm{d}f(x) &= \mathrm{d}(\sin x \tan x) \\ &= \tan x \, \mathrm{d}(\sin x) + \sin x \, \mathrm{d}(\tan x) \\ &= \tan x (\cos x \, \mathrm{d}x) + \sin x (\sec^2 x \, \mathrm{d}x); \\ f'(x) = \frac{\mathrm{d}f(x)}{\mathrm{d}x} &= \tan x \cos x + \sin x \sec^2 x = \sin x \sec^2 x + \sin x. \end{aligned}$$

3.6.17 If $u = \sin x$, then $y = u^3$. So,

$$\begin{aligned} \frac{\mathrm{d}u}{\mathrm{d}x} &= \cos x; \\ \frac{\mathrm{d}y}{\mathrm{d}u} &= 3u^2; \\ \frac{\mathrm{d}y}{\mathrm{d}x} &= \frac{\mathrm{d}y}{\mathrm{d}u}\frac{\mathrm{d}u}{\mathrm{d}x} = 3u^2 \cos x = 3 \sin^2 x \cos x. \end{aligned}$$

Using a more direct method:

$$\begin{aligned} y &= \sin^3 x = (\sin x)^3; \\ \mathrm{d}y &= 3(\sin x)^2 \, \mathrm{d}(\sin x) = 3 \sin^2 x \cos x \, \mathrm{d}x; \\ \frac{\mathrm{d}y}{\mathrm{d}x} &= 3 \sin^2 x \cos x. \end{aligned}$$

3.6.39

$$\begin{aligned} h(x) &= x \tan(2\sqrt{x}) + 7; \\ \mathrm{d}h(x) &= \tan(2\sqrt{x}) \, \mathrm{d}x + x \, \mathrm{d}\Big(\tan(2\sqrt{x})\Big) + 0 \\ &= \tan(2\sqrt{x}) \, \mathrm{d}x + x \sec^2(2\sqrt{x}) \, \mathrm{d}(2\sqrt{x}) \\ &= \tan(2\sqrt{x}) \, \mathrm{d}x + x \sec^2(2\sqrt{x}) \left(2 \frac{\sqrt{x} \, \mathrm{d}x}{2x}\right); \\ h'(x) &= \tan(2\sqrt{x}) + \sec^2(2\sqrt{x}) \sqrt{x} = \sqrt{x} \sec^2(2\sqrt{x}) + \tan(2\sqrt{x}). \end{aligned}$$