Section 3.1 Exercise Examples

#5

$f := x \to 2 \cdot x^2 - 4 \cdot x + 5$

$$f := x \mapsto 2 \cdot x^2 - 4 \cdot x + 5 \quad \textbf{(1.1)}$$

$f(-1)$

$$11 \quad \textbf{(1.2)}$$

$f(3)$

$$11 \quad \textbf{(1.3)}$$

$fp := \mathrm{D}(f)$

$$fp := x \mapsto 4 \cdot x - 4 \quad \textbf{(1.4)}$$

$solve(fp(x) = 0)$

$$1 \quad \textbf{(1.5)}$$

$fp(1)$

$$0 \quad \textbf{(1.6)}$$

#6

$f := x \to x^3 - 2 \cdot x^2 - 4 \cdot x + 2$

$$f := x \mapsto x^3 - 2 \cdot x^2 - 4 \cdot x + 2 \quad \textbf{(2.1)}$$

#7

$f := x \to \sin\left(\frac{x}{2}\right)$

$$f := x \mapsto \sin\left(\frac{x}{2}\right) \quad \textbf{(3.1)}$$

$f\left(\frac{\mathrm{Pi}}{2}\right)$

$$\frac{\sqrt{2}}{2} \quad \textbf{(3.2)}$$

$f\left(\frac{3 \cdot \mathrm{Pi}}{2}\right)$

$$\frac{\sqrt{2}}{2} \quad \textbf{(3.3)}$$

$fp := \mathrm{D}(f)$

$$fp := x \mapsto \frac{\cos\left(\frac{x}{2}\right)}{2} \tag{3.4}$$

$solve(fp(x) = 0)$

$$\pi \tag{3.5}$$

$fp(\mathrm{Pi})$

$$0 \tag{3.6}$$

3.1 #31

$f := x \to x^5 - x^3 + 9$

$$f := x \mapsto x^5 - x^3 + 9 \tag{4.1}$$

$fp := \mathrm{D}(f)$

$$fp := x \mapsto 5 \cdot x^4 - 3 \cdot x^2 \tag{4.2}$$

$solve(fp(x) = 0)$

$$0, 0, \frac{\sqrt{15}}{5}, -\frac{\sqrt{15}}{5} \tag{4.3}$$

$f\left(\frac{\sqrt{15}}{5}\right)$

$$-\frac{6\sqrt{15}}{125} + 9 \tag{4.4}$$

$evalf(\%)$

$$8.814096799 \tag{4.5}$$

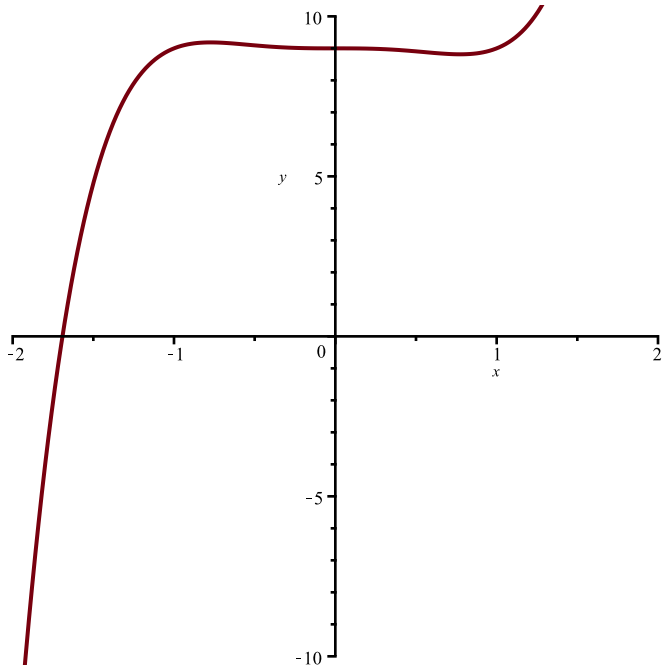
$evalf\left(f\left(-\frac{\sqrt{15}}{5}\right)\right)$

$$9.185903201 \tag{4.6}$$

$f\left(-\frac{\mathrm{sqrt}(15)}{5}\right)$

$$\frac{6\sqrt{15}}{125} + 9 \tag{4.7}$$

$with(plots):$
$plot(f(x), x = -2..2, y = -10..10)$



$$evalf\left(\frac{\mathrm{sqrt}(15)}{5}\right)$$

0.7745966692 **(4.8)**