Beispiel 7.75, 7.78, 7.116)

7.75)

a)

$y(x) := 2 \cdot \sqrt{x} \qquad 1 \le x \le 4$

LE

$y'(x) := \frac{d}{dx} y(x) \rightarrow x^{-\frac{1}{2}}$

$f(\zeta) := \int_1^4 \sqrt{1 + y'(x)^2}\, dx \xrightarrow{float, 3} 3.62$ LE

$\mathbf{clear}(f, y)$

b)

$y(x) := \frac{1}{2} \cdot x^2 \qquad a := -2 \qquad b := 2$

$y'(x) := \frac{d}{dx} y(x) \rightarrow x$

$f(\zeta) := \int_a^b \sqrt{1 + y'(x)^2}\, dx \xrightarrow{float, 3} 5.92$ LE

$\mathbf{clear}(f, y, a, b)$

c)

$y(x) := x^3 \qquad a := -1 \qquad b := 3$

$y'(x) := \frac{d}{dx} y(x) \rightarrow 3 \cdot x^2$

$f(\zeta) := \int_a^b \sqrt{1 + y'(x)^2}\, dx \xrightarrow{float, 3} 29.2$ LE

$\mathbf{clear}(f, y, a, b)$

7.78)

$a := 0 \qquad b := 2$

$y(x) := \left| \sin\left(\frac{\pi}{2} \cdot x\right) \right|$

$y'(x) := \frac{d}{dx} y(x) \rightarrow \frac{\pi \cdot \cos\left(\frac{x \cdot \pi}{2}\right) \cdot \mathrm{signum}\left(\sin\left(\frac{x \cdot \pi}{2}\right), 0\right)}{2}$

$f(\zeta) := \int_a^b \sqrt{1 + y'(x)^2}\, dx \xrightarrow{float, 3} 2.93$

$L := f(\zeta) \cdot 4 \xrightarrow{float, 4} 11.72$ LE

7.116)

1)

$$W := \int_{s_1}^{s_2} F(s)\,ds$$

$$a = \frac{dt}{dv} \qquad v = \frac{ds}{dt}$$

$$W := \int_{s_1}^{s_2} m \cdot a\,ds = \int_{v_1}^{v_2} m \cdot \frac{dv}{dt}\,ds \cdot \int_{v_1}^{v_2} m \cdot \frac{dv}{dt}\,dt = \int_{v_1}^{v_2} m \cdot v\,dv$$

$$W := \frac{1}{2} \cdot m \cdot \left(v_2^{\,2} - v_1^{\,2}\right)$$

2)

$$W := \frac{1}{2} \cdot m \cdot v^2$$

3)

$$v_1 := \frac{30}{3.6} \qquad m := 900$$

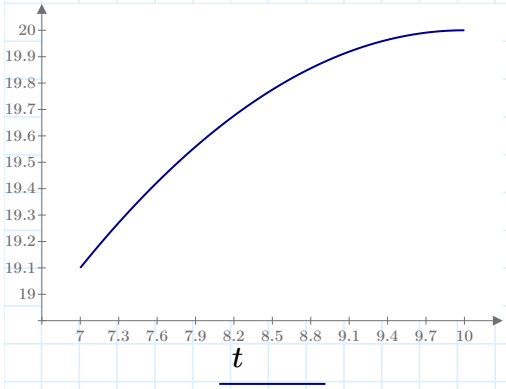
$$v_2 := \frac{60}{3.6} \xrightarrow{float,4} 16.67$$

$$W := \frac{1}{2} \cdot m \cdot \left(v_2^{\,2} - v_1^{\,2}\right) \rightarrow 93800.005 \text{ J}$$

7.85)

$\textbf{clear}\,(f, y, \delta, \zeta)$

$$\delta(t) := -0.1 \cdot t^2 + 2 \cdot t + 10$$



$\delta(t)$

$$\mu_{quad} := \sqrt{\frac{1}{17-0} \cdot \int_0^{17} \delta(t)^2 \, dt} \xrightarrow{float, 4} 17.56 \quad °C$$

$$\delta(t) := -0.1 \cdot t^2 + 2 \cdot t + 15$$

$$\frac{1}{17-0} \cdot \int_0^{17} \delta(t) \, dt \xrightarrow{float, 4} 22.37 \quad °C$$