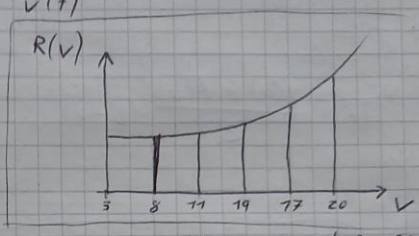
Aufgabe 2

$$t = \int_{v(t_0)}^{v(t)} \frac{m}{R(v)} \cdot dv = \int_{v(t_0)}^{v(t)} \frac{m}{-v \cdot \sqrt{v}} \cdot dv = \int_{v(t_0)}^{v(t)} \frac{m}{v^{\frac{3}{2}}} dv$$

$$= \int_{5\frac{m}{s}}^{20\frac{m}{s}} m \cdot v^{-\frac{3}{2}} dv$$



a) $Rf(h) = h \cdot \sum_{i=0}^{n-1} f(x_i + \frac{h}{2})$, $n = 5$, $m = 10\ kg$, $h = \frac{b-a}{n} = \frac{20-5}{5} = 3$

$$Rf(h) = 3 \cdot \sum_{i=0}^{4} 10\,kg \cdot (v_i + 1.5)^{-\frac{3}{2}}$$

b) $Tf(h) = h \cdot \left(\frac{f(a) + f(b)}{2} + \sum_{i=1}^{n-1} f(x_i) \right)$

$$Tf(h) = 3 \cdot \left(\frac{10 \cdot 5^{-\frac{3}{2}} + 10 \cdot 20^{-\frac{3}{2}}}{2} + \sum_{i=1}^{4} 10 \cdot v_i^{-\frac{3}{2}} \right)$$

c) $Sf(h) = \frac{h}{3} \cdot \left(\frac{1}{2} f(a) + \sum_{i=1}^{n-1} f(x_i) + 2 \cdot \sum_{i=1}^{n} f\left(\frac{x_{i-1} + x_i}{2} \right) + \frac{1}{2} f(b) \right)$

$$Sf(h) = \frac{h}{3} \cdot \left(\frac{1}{2} \cdot 10 \cdot 5^{-\frac{3}{2}} + \sum_{i=1}^{4} 10 \cdot v_i^{-\frac{3}{2}} + 2 \cdot \sum_{i=1}^{5} 10 \cdot \left(\frac{v_{i-1} + v_i}{2} \right)^{-\frac{3}{2}} + \frac{1}{2} \cdot 10 \cdot 20^{-\frac{3}{2}} \right)$$

$$\int_5^{20} m \cdot v^{-\frac{3}{2}} = -2m \cdot v^{-\frac{1}{2}} \Big|_5^{20}$$

$$= -2 \cdot 10 \cdot 20^{-\frac{1}{2}} + 2 \cdot 10 \cdot 5^{-\frac{1}{2}} = 4.47214$$