restart;

▼ Aufgabe 3: Grundlagen

$$\frac{7}{9} + \frac{5}{\frac{4}{13}}$$

$$\frac{613}{36} \tag{1.1}$$

$$\sqrt{3} \cdot \sin\left(\frac{2}{3} \cdot \pi\right)$$

$$\frac{3}{2} \tag{1.2}$$

$$\int_0^\pi \frac{x^{\frac{5}{2}}}{x^2 + 1} \, dx$$

$$-\frac{1}{12} \sqrt{2} \left(-4\sqrt{2}\,\pi^{3/2} + 3\ln\left(\frac{\pi - \sqrt{2}\,\sqrt{\pi} + 1}{\pi}\right) - 6\arctan\left(\frac{1 + \sqrt{2}\,\sqrt{\pi}}{-1 + 2\pi}\right) \right. \tag{1.3}$$
$$\left. - 3\ln\left(\frac{\pi + \sqrt{2}\,\sqrt{\pi} + 1}{\pi}\right) - 6\arctan\left(\frac{\sqrt{2}\,\sqrt{\pi} - 1}{-1 + 2\pi}\right) + 6\pi \right)$$

$$\frac{d}{dt} \operatorname{arccosh}(t)$$

$$\frac{1}{\sqrt{t - 1}\,\sqrt{t + 1}} \tag{1.4}$$

$$e^{\ln(42)}$$

$$42 \tag{1.5}$$

$$0^0$$

$$1 \tag{1.6}$$

▼ Aufgabe 4: Primzahlen

isprime(1111111111111111111111)

$$false \tag{2.1}$$

isprime(11111111111111111111111)

$$true \tag{2.2}$$

isprime(4776913109852041418248056622882488319)

$$true \tag{2.3}$$

isprime(56713727820156410577229101238628035243)

$$true \tag{2.4}$$

isprime(317810483173934359805482319433298719761)

$$false \tag{2.5}$$

▼ Aufgabe 5: Maple-Hilfe

$expand\left(\dfrac{x^5 - y^5}{x^6 - y^6}\right)$

$$\frac{x^5}{x^6 - y^6} - \frac{y^5}{x^6 - y^6} \tag{3.1}$$

$factor\left(\dfrac{x^5 - y^5}{x^6 - y^6}\right)$

$$\frac{x^4 + y x^3 + y^2 x^2 + y^3 x + y^4}{(y + x)\,(x^2 + x y + y^2)\,(y^2 - x y + x^2)} \tag{3.2}$$

$normal\left(\dfrac{x^5 - y^5}{x^6 - y^6}\right)$

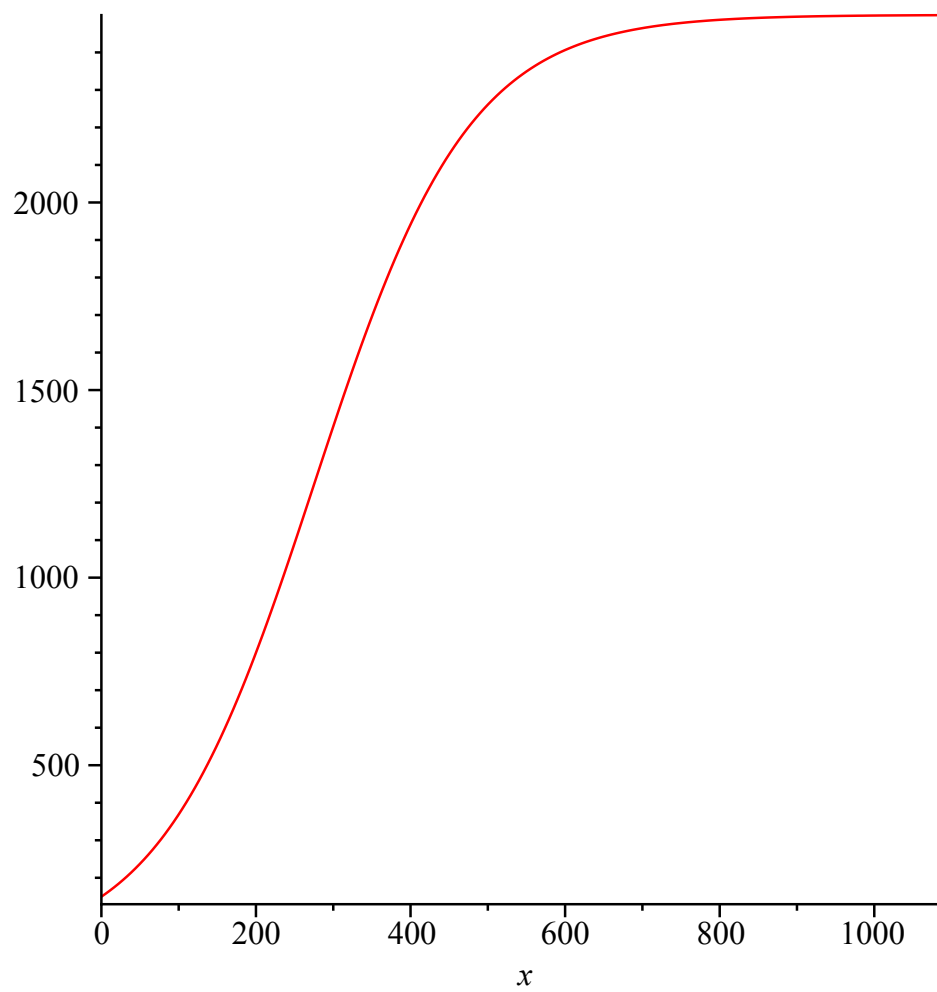$$\frac{x^4 + y x^3 + y^2 x^2 + y^3 x + y^4}{x^5 + y x^4 + y^2 x^3 + y^3 x^2 + y^4 x + y^5} \tag{3.3}$$

▼ Aufgabe 6: Wachstum

$f := x \to \dfrac{2500 \cdot e^{\frac{1}{100} \cdot x}}{5 \cdot \pi + e^{\frac{1}{100} \cdot x}}$

$$x \to \frac{2500\, e^{\frac{1}{100}\, x}}{5\, \pi + e^{\frac{1}{100}\, x}} \tag{4.1}$$

▼ a)

$plot(\,f(x), x = 0\,..\,3 \cdot 365\,)$

b)

$f(0)$

$$\frac{2500}{5\pi + 1} \qquad \textbf{(4.2.1)}$$

$evalf(f(0))$

$$149.6292492 \qquad \textbf{(4.2.2)}$$

c)

$\lim\limits_{x \to \infty} f(x)$

$$2500 \qquad \textbf{(4.3.1)}$$

d)

$w := solve(f''(x))$

$$100 \ln(5\pi) \tag{4.4.1}$$

$evalf(w)$

$$275.4167798 \tag{4.4.2}$$

$f'(w)$

$$\frac{25}{4} \tag{4.4.3}$$

e)

$\dfrac{8}{10} \cdot 2500$

$$2000 \tag{4.5.1}$$

$t80 := solve(f(x) = 2000)$

$$100 \ln(20\pi) \tag{4.5.2}$$

$evalf(t80)$

$$414.0462160 \tag{4.5.3}$$

f)

$fl := \displaystyle\int_0^\infty 2500 - f(x) \, \mathrm{d}x$

$$250000 \ln(5\pi + 1) \tag{4.6.1}$$

$evalf(fl)$

$$7.039713620 \; 10^5 \tag{4.6.2}$$