8.1

a)

x	f(x)
-0,4418	0,3
-0,270	0,4
-0,107	0,5
+0,057	0,6

$\frac{0,1}{0,1718} = 0,582$

$\frac{0,1}{0,163} = 0,613$

$\frac{0,1}{0,164} = 0,610$

$\frac{0,031}{0,3548} = 0,0326$

$\frac{-0,003}{0,321} = -0,0093$

$\frac{-0,0429}{0,1528}$

$= -0,0850$

$0,3 + 0,582(x+0,4418) + 0,0326 \cdot (x+0,4418)(x+0,27) + (-0,085) \cdot (x+0,4418) \cdot (x+0,27)(x+0,107)$

b)

$p(0) = 0,329$ f hat eine Nullstelle bei x 0,329

8.3

$\ln 4 = \int_1^4 \frac{dx}{x}$ $\quad f(x) = \frac{1}{x}$ $\quad \ln 4 = 1{,}386$

$[1, 4]$

a) Rechteckregel $\quad x_i = 1 + 0 \cdot \frac{4-1}{3} + \frac{4-1}{2 \cdot 3}$

$= 1 + 0 + 0{,}5$

$x_i = 1{,}5$

$f(1{,}5) = \frac{2}{3}$

$f(2{,}5) = 0{,}4$

$f(3{,}5) = 0{,}286$

$= \frac{b-a}{n}(y_0 + y_1 + y_2) = \frac{4-1}{3}\left(\frac{2}{3} + \frac{4}{10} + 0{,}286\right)$

$= 3{,}927$? falsch $= 1{,}352$

b) Trapezregel $\quad f(1) = 1 \quad f(2) = \frac{1}{2}$

$h = \frac{b-a}{n} = \frac{4-1}{3} = 1$ $\quad T = 0{,}5\left(1 + 2\left(\left(\frac{1}{2}\right) + \left(\frac{1}{3}\right) + \left(\frac{1}{4}\right)\right)\right)$

$= 0{,}5\left(1 + 1 + \frac{2}{3} + \frac{1}{4}\right) = 0{,}5 \cdot \left(\frac{12}{12} + \frac{12}{12} + \frac{8}{12} + \frac{3}{12}\right) = \frac{35}{12} \cdot \frac{1}{2} = 1{,}4583$

c) Simsonregel $\quad y_i = f(x_i) = f\left(a + i \cdot \frac{b-a}{2n}\right)$

$x_0 = 1 + 0 \cdot \frac{4-1}{6} = 1$ $\quad f(x_0) = 1$

$x_1 = 1 + 1 \cdot \frac{3}{6} = 1{,}5$ $\quad f(x_1) = \frac{2}{3}$

$x_2 = 1 + 2 \cdot \frac{1}{2} = 2$ $\quad f(x_2) = \frac{1}{2}$

$x_3 = 1 + 3 \cdot \frac{1}{2} = 2{,}5$ $\quad f(x_3) = \frac{4}{10} = 0{,}4$

$x_4 = 1 + 4 \cdot \frac{1}{2} = 3$ $\quad f(x_4) = \frac{1}{3}$

$x_5 = 1 + 5 \cdot \frac{1}{2} = 3{,}5$ $\quad f(x_5) = \frac{2}{7}$

$x_6 = 1 + 6 \cdot \frac{1}{2} = 4$ $\quad f(x_6) = \frac{1}{4}$

$$\int_a^b f(x)\,dx = \frac{b-a}{6n}\left(y_0 + 4y_1 + 2y_2 + \ldots + 4y_{2n-1} + y_{2n}\right)$$

$= \frac{4-1}{6 \cdot 3}\left(1 + 4 \cdot \frac{2}{3} + 2 \cdot \frac{1}{2} + 4 \cdot 0{,}4 + \frac{2}{3} + \frac{8}{7} + \frac{1}{4}\right)$

$= \frac{3}{18}(8{,}326)$

$= 1{,}388$