

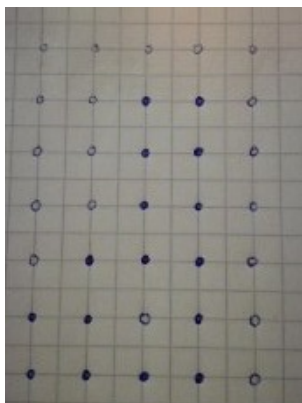
Aufgabe 1



Aufgabenteil a:

$$v = \{(2, 3), (2, 4), (3, 3), (3, 4), (4, 3), (4, 4), (5, 2), (5, 3), (5, 4), (6, 1), (6, 2), (6, 4), (7, 1), (7, 2), (7, 3), (7, 4)\}$$

Aufgabenteil b:



Aufgabe 2

Aufgabenteil a:

$$f(x) = \frac{1}{(1-x)^2}$$

$$f'(x) = \frac{2}{(1-x)^3}$$

$$f''(x) = \frac{6}{(1-x)^4}$$

$$f'''(x) = \frac{24}{(1-x)^5}$$

$$P_0(x) = \frac{1}{9}$$

$$\begin{aligned} P_1(x) &= \frac{1}{9} + \frac{2}{27}(x+2) \\ &= \frac{2}{27}x + \frac{3}{27} + \frac{4}{27} \\ &= \frac{2}{27}x + \frac{7}{27} \end{aligned}$$

$$\begin{aligned} P_2(x) &= \frac{2}{27}x + \frac{7}{27} + \frac{1}{27}(x+2)^2 \\ &= \frac{2}{27}x + \frac{7}{27} + \frac{1}{27}x^2 + \frac{4}{27}x + \frac{4}{27} \\ &= \frac{1}{27}x^2 + \frac{6}{27}x + \frac{11}{27} \end{aligned}$$

$$\begin{aligned} P_3 &= \frac{1}{27}x^2 + \frac{6}{27}x + \frac{11}{27} + \frac{4}{243}(x+2)^3 \\ &= \frac{4}{243}x^3 + \frac{3}{81}x^2 + \frac{8}{81}x^2 + \frac{18}{81}x + \frac{16}{81}x + \frac{99}{243} + \frac{32}{243} \\ &= \frac{4}{243}x^3 + \frac{11}{81}x^2 + \frac{34}{81}x + \frac{131}{243} \end{aligned}$$

Intervalle:

$$\begin{aligned} g_0(x) &= f(x) - P_0(x) = \frac{1}{(1-x)^2} - \frac{1}{9} \quad g_0(-4) = \frac{1}{25} - \frac{1}{9} = \frac{9}{225} - \frac{25}{225} = \frac{-16}{225} \\ g_0(0) &= 1 - \frac{1}{9} = \frac{8}{9} \\ I_0 &= P_0 + \left[-\frac{8}{9}, \frac{8}{9}\right] \end{aligned}$$

$$\begin{aligned} g_1(x) &= f(x) - P_1(x) = \frac{1}{(1-x)^2} - \frac{2}{27}x - \frac{7}{27} \\ g_1(-4) &= \frac{1}{25} + \frac{8}{27} - \frac{7}{27} = \frac{1}{25} + \frac{1}{27} \\ g_1(0) &= 1 - \frac{7}{27} = \frac{20}{27} \\ I_1 &= P_1 + \left[-\frac{20}{27}, \frac{20}{27}\right] \end{aligned}$$

$$\begin{aligned} g_2(x) &= f(x) - P_2(x) = \frac{1}{(1-x)^2} - \frac{1}{27}x^2 - \frac{6}{27}x - \frac{11}{27} \\ g_2(-4) &= \frac{1}{25} - \frac{16}{27} + \frac{24}{27} - \frac{11}{27} = \frac{1}{25} - \frac{3}{27} \\ g_2(0) &= 1 - \frac{11}{27} = \frac{16}{27} \\ I_2 &= P_2 + \left[-\frac{16}{27}, \frac{16}{27}\right] \end{aligned}$$

$$\begin{aligned} g_3(x) &= f(x) - P_3(x) = \frac{1}{(1-x)^2} - \frac{4}{243}x^3 - \frac{11}{81}x^2 - \frac{34}{81}x - \frac{131}{243} \\ g_3(-4) &= \frac{1}{25} + \frac{256}{243} - \frac{176}{81} + \frac{136}{81} - \frac{131}{243} = \frac{1}{25} + \frac{125}{243} - \frac{40}{81} = \frac{1}{25} + \frac{5}{243} \\ g_3(0) &= 1 - \frac{131}{243} = \frac{112}{243} \\ I_3 &= P_3 + \left[-\frac{112}{243}, \frac{112}{243}\right] \end{aligned}$$

Aufgabenteil b:

$$\begin{aligned} g_0 &= x_0 \\ g_1 &= x_0 + t + x_0 t \\ g_2 &= x_0 + t + x_0 t + t^2 + x_0 t^2 \\ g_3 &= x_0 + t + x_0 t + t^2 + x_0 t^2 + t^3 + x_0 t^3 \\ g_4 &= g_3 \end{aligned}$$

Fixpunkt erreicht.