HM2 Serie 4 Aufgabe 1

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Datenpunkte:

- $(x_0, y_0) = (0, 1013)$
- $(x_1, y_1) = (2500, 747)$
- $(x_2, y_2) = (5000, 540)$
- $(x_3, y_3) = (10000, 226)$

Lagrange-Interpolation:

$p(x) = 1013 \cdot l_0(3750) + 747 \cdot l_1(3750) + 540 \cdot l_2(3750) + 226 \cdot l_3(3750)$

$l_0(3750) = \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_0-x_1)(x_0-x_2)(x_0-x_3)} = \frac{(3750-2500)(3750-5000)(3750-10000)}{(0-2500)(0-5000)(0-10000)} = -\frac{5}{64}$

$l_1(3750) = \frac{(x-x_0)(x-x_2)(x-x_3)}{(x_1-x_0)(x_1-x_2)(x_1-x_3)} = \frac{(3750-0)(3750-5000)(3750-10000)}{(2500-0)(2500-5000)(2500-10000)} = \frac{5}{8}$

$l_2(3750) = \frac{(x-x_0)(x-x_1)(x-x_3)}{(x_2-x_0)(x_2-x_1)(x_2-x_3)} = \frac{(3750-0)(3750-2500)(3750-10000)}{(5000-0)(5000-2500)(5000-10000)} = \frac{15}{32}$

$l_3(3750) = \frac{(x-x_0)(x-x_1)(x-x_2)}{(x_3-x_0)(x_3-x_1)(x_3-x_2)} = \frac{(3750-0)(3750-2500)(3750-5000)}{(10000-0)(10000-2500)(10000-5000)} = -\frac{1}{64}$

$p(x) = 1013 \cdot -\frac{5}{64} + 747 \cdot \frac{5}{8} + 540 \cdot \frac{15}{32} + 226 \cdot -\frac{1}{64} = 637.328125$