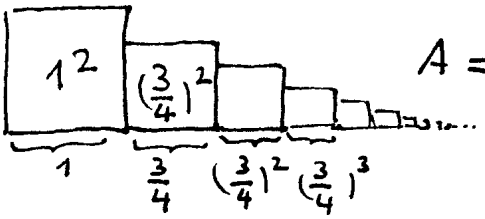
Ueb

1 Scherzaufgabe:

$$1 + \left(\tfrac{1}{10}\right)^1 + \left(\tfrac{1}{10}\right)^2 + \left(\tfrac{1}{10}\right)^3 + \left(\tfrac{1}{10}\right)^4 + \cdots = ?$$

2



$$A = 1^2 + \left(\tfrac{3}{4}\right)^2 + \left(\tfrac{3}{4}\right)^4 + \left(\tfrac{3}{4}\right)^6 + \left(\tfrac{3}{4}\right)^8 + \cdots = ?$$

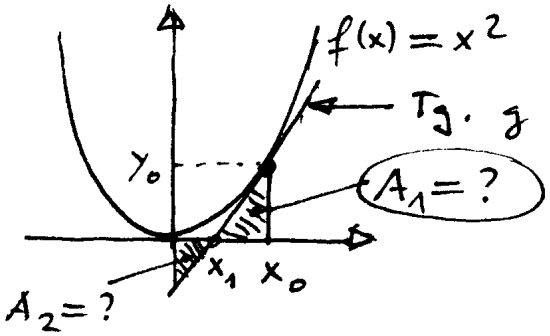
$$\rightsquigarrow A = \sum_{k=0}^{\infty} \left(\left(\tfrac{3}{4}\right)^2\right)^k = \frac{1}{1-\left(\frac{3}{4}\right)^2} = \frac{1}{1-\frac{9}{16}} = \frac{1}{\frac{7}{16}} = \frac{16}{7}$$

3

$$\lim_{n\to\infty} \frac{4n^2+3n-2+\sin(n)}{3n^2+2n-1} = ?$$

$$\rightsquigarrow = \lim_{n\to\infty} \frac{4+\frac{3}{n}-\frac{2}{n^2}+\frac{\sin(n)}{n^2}}{3+\frac{2}{n}-\frac{1}{n^2}} = \frac{4+0-0+0}{3+0-0} = \frac{4}{3}$$

4



$$\rightsquigarrow y_0 = x_0^2$$

T_g: $g(x) = a \cdot x + b$

$a = f'(x_0) = 2x_0$

$b = ? \rightsquigarrow g(x_0) = y_0$

$$\rightsquigarrow a \cdot x_0 + b = 2 \cdot x_0 \cdot x_0 + b = x_0^2$$

$$b = -x_0^2$$

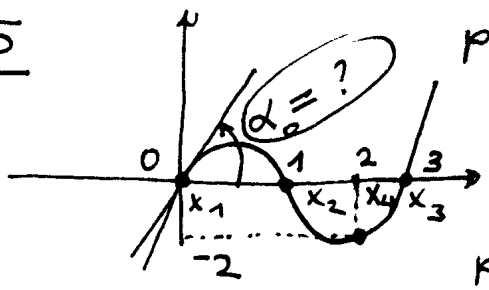
$$g(x) = 2x_0 \cdot x - x_0^2, \quad g(x_1) = 2 \cdot x_0 \cdot x_1 - x_0^2 = 0$$

$$x_1 = \frac{x_0}{2} \quad !!!$$

$$\Rightarrow A_1 = A_2$$

$$A_1 = \underbrace{\left(x_0 - \tfrac{x_0}{2}\right)}_{x_0 - x_1} \cdot \underbrace{x_0^2}_{y_0} \cdot \frac{1}{2} = \frac{x_0^3}{4}$$

5



$$p(x) = a_3x^3 + a_2x^2 + a_1x + a_0$$

$$= a(x-x_1)(x-x_2)(x-x_3)$$

$$p(x_4) = p(2) = -2$$