2221 $x^3 + 3x + 1 = 0$

NR $x_{n+1} = x_n - \dfrac{x_n^3 + 3x_n + 1}{3x_n^2 + 3}$

Använd grafräknaren beräkna värdet med. tex. Y-cal

$x_0 = -0.5 \Rightarrow x_1 = -0.5 - \dfrac{(-0.5)^3 + 3(-0.5) + 1}{3(-0.5)^2 + 3}$

$x_1 = -0.333333$

$x_2 = -0.322222$

$x_3 = -0.322185$

2234 b) $a_n = 20 + (n-1)$

$a_n = x + (n-1)\cdot 2$ $\quad a_1 = x \quad a_{25} = x + (25-1)\cdot 2$

$\sum_{n=1}^{25} a_n = 25\dfrac{(x + x + 24\cdot 2)}{2} = 25(x + 24)$

Totalt antal platser 1200 $\Rightarrow$

$25(x+24) = 1200$

$x + 24 = 48$

$x = 24$ Svar: 24 platser

2236 $a_{10} = 20 \quad a_{20} = 10$

Aritmetisk talföljd $a_n = a_1 + (n-1)\cdot d$

$d = -1$ talföljden: minskar med 1 från början.

$a_{10} = 20 \Rightarrow a_1 + (10-1)\cdot(-1) = 20$

$a_1 + 9\cdot(-1) = 20$

$a_1 = 29 \quad a_n = 29 + (n-1)(-1) =$

$a_n = 29 - n + 1 = \underline{30 - n}$

$a_{55} = 30 - 55 = \underline{-25}$

2244 c) $\sum_{n=3}^{8} 2^n$

$$S_n = \sum_{n=3}^{8} 2^n = 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8$$

$$2 \cdot S_n = 2 \cdot \sum_{n=3}^{8} 2^n = 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9$$

$$2 \cdot S_n - S_n = 2^9 - 2^3$$

$$S_n(2-1) = 2^9 - 2^3$$

$$S_n = 2^9 - 2^3 = 512 - 8 = \underline{504}$$

2250 $a_n = 1.05^n$

$a_n < 50 \qquad 1.05^n < 50$

$$\log 1.05^n < \log 50$$

$$n \cdot \log 1.05 < \log 50$$

$$n < \frac{\log 50}{\log 1.05} \approx 80{,}18\ldots$$

n heltal $\Rightarrow$ närmaste heltal $n = 80$

Svar 80 st

2252 Geometrisk serie: Kvoten $k = \frac{a_{n+1}}{a_n}$ lika

$$\Rightarrow \frac{a_6}{a_3} = \left(\frac{a_{n+1}}{a_n}\right)^3 = k^3 \qquad k^3 = \frac{a_6}{a_3} = \frac{1280}{20} = 64 \qquad k = 64^{\frac{1}{3}} = 4$$

$\frac{a_3}{a_1} = k^2 = 16 \qquad a_1 = \frac{a_3}{k^3} = \frac{20}{16} = 1.25 \qquad a_2 = 5 \qquad a_3 = 20$

$a_4 = 80 \qquad a_5 = 320 \qquad a_6 = 1280$

2253 $\sum_{k=0}^{n}\left(\frac{7}{5}\right)^k > 1000$

$$S_n = \sum_{k=0}^{n}\left(\frac{7}{5}\right)^k = \underbrace{\left(\frac{7}{5}\right)^0}_{1} + \left(\frac{7}{5}\right)^1 + \left(\frac{7}{5}\right)^2 + \quad + \left(\frac{7}{5}\right)^k$$

$$\frac{7}{5}\cdot S_n = \frac{7}{5}\sum_{k=0}^{n}\left(\frac{7}{5}\right)^k = \left(\frac{7}{5}\right)^1 + \left(\frac{7}{5}\right)^2 + \quad + \left(\frac{7}{5}\right)^k + \left(\frac{7}{5}\right)^{k+1}$$

$$\frac{7}{5}S_n - S_n = \left(\frac{7}{5}\right)^{k+1} - 1$$

$$S_n\left(\frac{7}{5}-1\right) = \left(\frac{7}{5}\right)^{k+1} - 1 \qquad S_n = \frac{\left(\frac{7}{5}\right)^{k+1}-1}{\frac{7}{5}-1} = \frac{1{,}4^{k+1}-1}{0{,}4}$$

$$S_n = \sum_{k=0}^{n}\left(\frac{7}{5}\right)^k > 1000 \Rightarrow \frac{1{,}4^{k+1}-1}{0{,}4} > 1000$$

$$1{,}4^{k+1} - 1 > 400 \qquad 1{,}4^{k+1} > 401$$

$$\log 1{,}4^{k+1} > \log 401$$

$$(k+1)\log 1{,}4 > \log 401$$

$$k+1 > \frac{\log 401}{\log 1{,}4}$$

$$k > \frac{\log 401}{\log 1{,}4} \approx 17{,}8$$

k heltal $\Rightarrow k > 18$

2254 $\frac{3}{4}, \frac{1}{2}, \frac{1}{3}, \ldots$

Geometrisk talföljd → kvoten $\frac{1/2}{3/4} = \frac{1}{2} \cdot \frac{4}{3} = \frac{2}{3}$

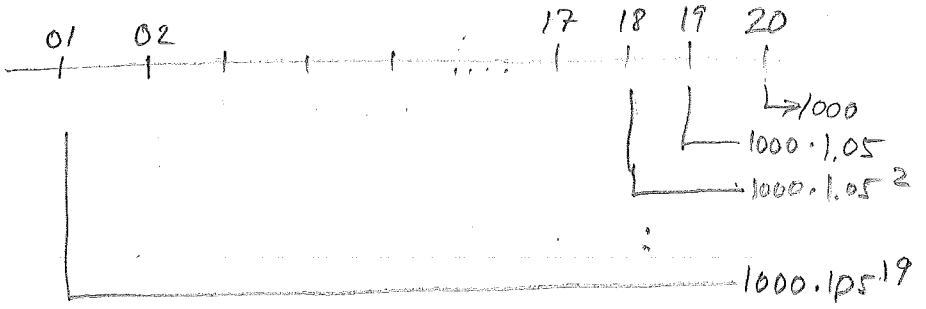
$\Rightarrow a_n = \frac{3}{4} \cdot \left(\frac{2}{3}\right)^{n-1}$

$$\sum_{n=1}^{5} a_n = \frac{3}{4} + \frac{3}{4} \cdot \frac{2}{3} + \frac{3}{4}\left(\frac{2}{3}\right)^2 + \frac{3}{4}\left(\frac{2}{3}\right)^3 + \frac{3}{4}\left(\frac{2}{3}\right)^4 =$$

$$\frac{3}{4}\,\frac{\left(1-\left(\frac{2}{3}\right)^5\right)}{1-\frac{2}{3}} = \frac{3}{4} \cdot \frac{\left(1-\frac{2^5}{3^5}\right)}{\frac{1}{3}} = \frac{3}{4} \cdot \frac{3}{1} \cdot \left(\frac{3^5-2^5}{3^5}\right) =$$

$$\frac{3^2\left(3^5-2^5\right)}{3^5 \cdot 2^2} = \frac{3^5-2^5}{3^3 \cdot 2^2} = \underline{\underline{\frac{211}{108}}}$$

2261



$a = 1000 \quad k = 1{,}05 \quad n = 20$

$$S_{20} = 1000 \cdot \frac{(1.05^{20}-1)}{1.05-1} = 33065.95\ldots \approx 33000$$

Svar Ca 33000kr.

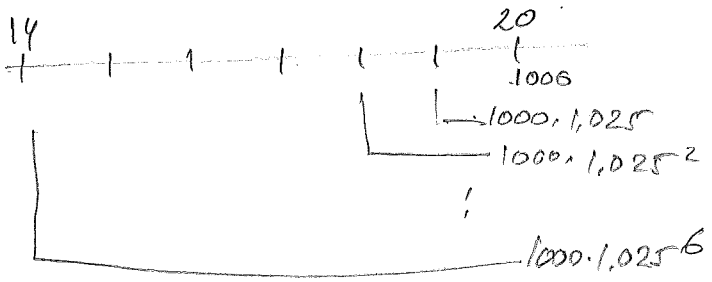
2262 A: 7 ränteår

S_A : $6000 \cdot 1{,}025^7 \approx 7132$

B: Ett årsränta

S_B $7000 \cdot 1{,}025 = 7175$

C:



7 insättningar $n = 7$

$a : 1000$

$k = 1{,}025$

$S_C : 1000\left(\frac{1{,}025^7 - 1}{1{,}025 - 1}\right) \approx 7547$

Alternativ C bäst. (≈ 7547 kr)