1 1 a) Finn reelle tall k og r slik at vi for alle reelle tall x har

$$x^2 + 8x + 20 = r\left[\left(\frac{x+k}{\sqrt{r}}\right)^2 + 1\right]$$

$$x^2 + 8x + 20 = r\left(\frac{x+k}{\sqrt{r}}\right)^2 + r$$

$$= r\left(\frac{x^2 + 2xk + k^2}{\sqrt{r}}\right) + r$$

$$= \frac{x^2 r + 2xk + k^2 + r}{\sqrt{r}}$$

Sammenligner koeffisientene og setter opp ligningssett

Karen [illegible]

$$1 = \frac{r}{\sqrt{r}}$$

$$8 = \frac{2k}{\sqrt{r}}$$

$$20 = k^2 + r$$

12 selzer kaniner när de är 3 år
Föder en varje år 2 kaniner som 0 är de första

x_n antal 0 åriga   generation n

y_n antal 1 åriga

z_n antal 2 åriga

a) bestäm att

$$\begin{pmatrix} x_{n+1} \\ y_{n+1} \\ z_{n+1} \end{pmatrix} = M \cdot \begin{pmatrix} x_n \\ y_n \\ z_n \end{pmatrix}$$

$$M = \begin{pmatrix} 0 & 2 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$$

c) Finn M^4

M^2 :

$$\begin{array}{ccc|ccc} & & & 0 & 2 & 0 \\ & & & 1 & 0 & 0 \\ & & & 0 & 1 & 0 \\ \hline 0 & 2 & 0 & 2 & 0 & 0 \\ 1 & 0 & 0 & 0 & 2 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 \end{array}$$

$(M^2)^2$:

$$\begin{array}{ccc|ccc} & & & 2 & 0 & 0 \\ & & & 0 & 2 & 0 \\ & & & 1 & 0 & 0 \\ \hline 2 & 0 & 0 & 4 & 0 & 0 \\ 0 & 2 & 0 & 0 & 4 & 0 \\ 1 & 0 & 0 & 2 & 0 & 0 \end{array}$$

2^n

d)

$$\begin{array}{ccc|ccc} & & & 4 & 0 & 0 \\ & & & 0 & 4 & 0 \\ & & & 2 & 0 & 0 \\ \hline 4 & 0 & 0 & 16 & 0 & 0 \\ 0 & 4 & 0 & 0 & 16 & 0 \\ 2 & 0 & 0 & 4 & 0 & 0 \end{array}$$

$1, 2, 4, 16 = 2^n$

$0, 1, 2, 4 = 2^{n-1}$

[illegible]

$$\begin{array}{ccc} 2^n & 0 & 0 \\ 0 & 2^n & 0 \\ 2^{n-1} & 0 & 0 \end{array}$$

4

$$|A||B| \cos v = A \cdot B \quad | : |A| \cdot |B|$$

$$\cos v = \frac{A \cdot B}{|A| \cdot |B|}$$

$$= \frac{(-1,-2,2,4) \cdot (2,2,-2,-2)}{\sqrt{1+4+4+16}\,\sqrt{4+4+4+4}}$$

$$= \frac{-2-4-4-8}{5 \cdot 4}$$

$$= \frac{-18}{20} = \frac{-9}{10}$$

4 $(2,-1,1)$ $(0,5,0)$ $(0,0,1)$

$$\begin{vmatrix} 2 & -1 & 1 \\ 0 & 5 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 2 \begin{vmatrix} 5 & 0 \\ 0 & 1 \end{vmatrix} - (-1) \begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix} + 1 \begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix}$$

$$= 10$$

E

5 $\boxed{A}$

6 $u = \arccos(x)$ $\int \arccos x \, dx$

$x = \cos(\alpha)$

$dx = -\sin(\alpha)$

$-\int u \sin(u)$ $\boxed{C}$

7 $f(x) = \sin(x^2)$, $[0, \sqrt{\pi}]$, on y axis

F wh $2\pi \int_a^b x f(x)$

$2\pi \int_0^{\sqrt{\pi}} \sin(x^2)$

$u = \sin(x^2)$ $v = x$

$u' = \cos(x^2)\, 2x$ $v' = 1$

$2\pi [\sin(x^2) x - \int 2x \cos x$