P20: a) $\begin{pmatrix}-2\\3\end{pmatrix}$ b) ↯ c) $\begin{pmatrix}1616 & 2016 & 2424\\2016 & 2516 & 3024\\2424 & 3024 & 3636\end{pmatrix}$

d) ↯ e) $\begin{pmatrix}4 & 41\\5 & 50\\6 & 61\end{pmatrix}$ f) 13

P21 $A=\begin{pmatrix}a_{11} & a_{12} & a_{13}\\a_{21} & a_{22} & a_{23}\\a_{31} & a_{32} & a_{33}\end{pmatrix}$

$$\begin{aligned} a_{11}-a_{12} &= 0\\ 3a_{11}-a_{12}+a_{13} &= -2\\ -2a_{11}+a_{12}-2a_{13} &= 1\end{aligned} \qquad \begin{aligned} a_{11}-a_{12} &= 0\\ 4a_{11}-a_{12} &= -3\\ -2a_{11}+a_{12}-2a_{13} &= 1\end{aligned}$$

$$\begin{aligned} 3a_{11} &= -3\\ 4a_{11}-a_{12} &= -3\\ -2a_{11}+a_{12}-2a_{13} &= 1\end{aligned} \qquad \begin{aligned} a_{11} &= -1\\ a_{12} &= -1\\ a_{12}-2a_{13} &= -1\end{aligned}$$

$A=\begin{pmatrix}-1 & -1 & 0\\2 & 2 & -1\\1 & 0 & -3\end{pmatrix}$

$$\begin{aligned} a_{11} &= -1\\ a_{12} &= -1\\ a_{13} &= 0\end{aligned}$$

(2. & 3. Zeile gleich, nur rechte Seite anders)

P22 $u,v\in C^{\infty}(\mathbb{R})$ beliebig oft stetig differenzierbare Fkt.

zz: $f(\alpha u+\beta v)=\alpha f(u)+\beta f(v)$

a) $f_1(u+v)=2(u+v)+3=2u+2v+3$

$f_1(u)+f_1(v)=2u+3+2v+3$ ↯

b) $f_2(\alpha u+\beta v)=(\alpha u+\beta v)'=\alpha u'+\beta v'=\alpha f_2(u)+\beta f_2(v)$

c) $\left.\begin{aligned} f_3(\alpha u) &= \alpha^2u^2\\ \alpha f_3(u) &= \alpha u^2\end{aligned}\right\}\neq$ f. $u\not\equiv 0$, $\alpha\neq 1$

d) $f_4(\alpha u+\beta v)=(\alpha u+\beta v)''-(\alpha u+\beta v)$

$=\alpha u''+\beta v''-\alpha u-\beta v=\alpha(u''-u)+\beta(v''-v)$

$=\alpha f_4(u)+\beta f_4(v)$ ✓