S 220 Nr. 5

a) $f(x) = ax^3 + bx^2 + cx + d$

$f'(x) = 3ax^2 + 2bx + c \quad ; \; A(2|0) \; ; \; B(-2|4) \quad C(-4|8)$

$T(0|f(0)) \Rightarrow f'(0) = 0$ notw. Bed

$T(0|?): \; f'(0) = 3a \cdot 0^2 + 2b \cdot 0 + c = 0$

$A \; : \; f(2) = a \cdot 2^3 + b \cdot 2^2 + c \cdot 2 + d = 0$

$B \; : \; f(-2) = a \cdot (-2)^3 + b \cdot (-2)^2 + c \cdot (-2) + d = 4$

$C \; : \; f(-4) = a(-4)^3 + b \cdot (-4)^2 + c \cdot (-4) + d = 8$

$$\left(\begin{array}{cccc|c} 0 & 0 & 1 & 0 & 0 \\ 8 & 4 & 2 & 1 & 0 \\ -8 & 4 & -2 & 1 & 4 \\ -64 & 16 & -4 & 1 & 8 \end{array}\right) \overset{GTR}{\Rightarrow} \left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -\frac{1}{4} \\ 0 & 1 & 0 & 0 & -\frac{5}{6} \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & \frac{16}{3} \end{array}\right)$$

$f(x) = -\frac{1}{4}x^3 - \frac{5}{6}x^2 + \frac{16}{3}$

b) $f(x) = ax^3 + bx^2 + cx + d \quad ; \; A(2|2) \; ; \; B(3|9)$

$f'(x) = 3ax^2 + 2bx + c \quad T(1|1) \Rightarrow f'(1) = 0 \wedge f(1) = 1$

$T(1|1): \begin{cases} f'(1) = 3a \cdot 1^2 + 2b \cdot 1 + c = 0 \\ f(1) = a \cdot 1^3 + b \cdot 1^2 + c \cdot 1 + d = 1 \end{cases}$

$A \; : \; f(2) = a \cdot 2^3 + b \cdot 2^2 + c \cdot 2 + d = 2$

$B \; : \; f(3) = a \cdot 3^3 + b \cdot 3^2 + c \cdot 3 + d = 9$

$$\left(\begin{array}{cccc|c} 3 & 2 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \\ 8 & 4 & 2 & 1 & 2 \\ 27 & 9 & 3 & 1 & 9 \end{array}\right) \overset{GTR}{\Rightarrow} \left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & -3 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 0 \end{array}\right)$$

$f(x) = x^3 - 3 \cdot x^2 + 3 \cdot x$