1) $f(x) = e^{4-2x} + 2x$

-> $P_4(x;1)$

-> $R_4(1{,}1;1)$

-> Extremstellen

-> Umkehrfunktion der 1. Ableitung

2) $f(x) = 9 \cdot \sqrt[3]{2x+17}$ -> $P_3(x;5)$

3) $f(x) = -9 \cdot \cos\left(\frac{1}{9}x + \frac{2}{3}\pi\right)$ -> $P_4(x;\pi)$

-> Umkehrfunktion

-> Grundstellen $x \in [-4\pi; 4\pi]$

n	$f^{(n)}(x)$	$f^{(n)}(1)$	$(x-1)^n$	$n!$
0	$e^{4-2x}+2x$	e^2+2	1	1
1	$-2e^{4-2x}+2$	$-2e^2+2$	$(x-1)$	1
2	$4e^{4-2x}$	$4e^2$	$(x-1)^2$	2
3	$-8e^{4-2x}$	$-8e^2$	$(x-1)^3$	6
4	$16e^{4-2x}$	$16e^2$	$(x-1)^4$	24
5	$-32e^{4-2x}$		$(x-1)^5$	120

$$P_4(x,1) = e^2+2 + (-2e^2+2)(x-1) + 2e^2\cdot(x-1)^2 - \tfrac{4}{3}e^2(x-1)^3 + \tfrac{2}{3}e^2(x-1)^4$$

$$R_4(1{,}1;1) = \frac{f^{(5)}(1+\vartheta(1{,}1-1))}{5!}\cdot(1{,}1-1)^5$$

$$= \frac{1}{120}\cdot\frac{1}{10^5}\cdot\left(-32\,e^{4-2\cdot(1+\vartheta\cdot 0{,}1)}\right)$$

$$R_4(1{,}1;1) = -\frac{32}{110 \cdot 10^5} \cdot e^{2-0{,}2\cdot 1}$$

$$= \boxed{-\frac{4 \cdot e^2}{15 \cdot 10^5}} \cdot \frac{1}{e^{0{,}2\cdot 1}}$$

$f = 1 \Rightarrow \frac{1}{e^{0{,}2}} < 1$

$f = 0 \Rightarrow \frac{1}{e^0} = 1$

$$f'(x) = -2e^{4-2x} + 2 = 0 \quad | -2$$

$$-2 = -2e^{4-2x} \quad | : (-2)$$

$$1 = e^{4-2x} \quad | \ln$$

$$\ln(1) = 4 - 2x \quad | +2x$$

$$2x = 4 \quad | : 2$$

$$x = 2 \rightarrow f''(2) = 4 \cdot e^{4-2\cdot 2} = 4 > 0 \Rightarrow TP$$

$$TP(2 \mid f(2)) = TP(2 \mid 5)$$

$$f(x) = e^{4-2x} + 2 \cdot x = e^0 + 4 = 5$$

$f(x) = y = -2e^{4-2x} + 2$ $\quad | -2$

$y - 2 = -2 \cdot e^{4-2x}$ $\quad | \cdot (-\frac{1}{2})$

$1 - \frac{y}{2} = e^{4-2x}$ $\quad | \ln$

$\ln(1 - \frac{1}{2}y) = 4 - 2x$ $\quad | -4 \cdot (-\frac{1}{2})$

$-\frac{1}{2} \cdot \ln(1 - \frac{1}{2}y) + 2 = x$

$f^{-1}(x) = 2 - \frac{1}{2} \cdot \ln(1 - \frac{1}{2}x)$; $D = \mathbb{R}^{<2}$

$\left[= 2 + \ln \sqrt{\frac{1}{1 - 0{,}5x}} \right]$

$$f(x) = g \cdot \sqrt[3]{2x+17} = g \cdot (2x+17)^{1/3}$$

n	$f^{(n)}(x)$	$f^{(n)}(5)$	$(x-5)^n$	$n!$
0	$g \cdot (2x+17)^{1/3}$	$g \cdot 3$	1	1
1	$6\,(2x+17)^{-2/3}$	$6 \cdot (1/3)^2$	$(x-5)$	1
2	$-8\,(2x+17)^{-5/3}$	$-8 \cdot (1/3)^5$	$(x-5)^2$	2
3	$80/3\,(2x+17)^{-8/3}$	$80/3 \cdot (1/3)^8$	$(x-5)^3$	6

$$\sqrt[3]{2 \cdot 5 + 17} = \sqrt[3]{27} = 3$$

$$P_3(x,5) = 27 + 2/3 \cdot (x-5) - 4 \cdot (1/3)^5 \cdot (x-5)^2 + \frac{40}{9} \cdot (1/3)^8 \cdot (x-5)^3$$