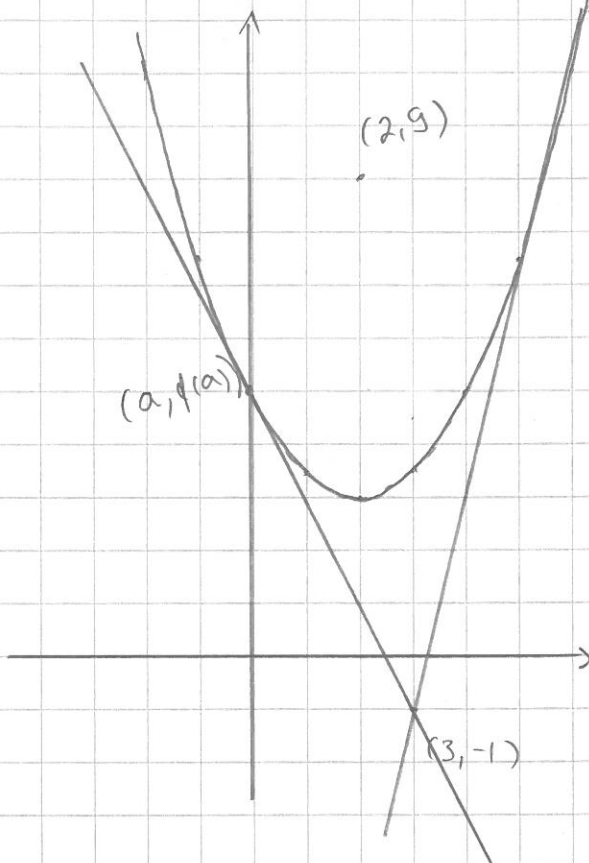


$$y = -\frac{2}{45}x^2 + \frac{4}{3}x$$

$$y' = -\frac{4}{45}x + \frac{4}{3} \Rightarrow z_t = y'(0) = \frac{4}{3} = \tan \alpha \Rightarrow \alpha \approx 53,130^\circ \approx 53,10^\circ$$

$$7.21 \quad f(x) = \frac{1}{2}x^2 - 2x + 5$$

$$f'(x) = x - 2$$



$$\begin{cases} z_t = f'(a) = a - 2 \end{cases}$$

$$\begin{cases} z_t = \frac{\Delta y}{\Delta x} = \frac{f(a) - (-1)}{a - 3} = \frac{(\frac{1}{2}a^2 - 2a + 5) + 1}{a - 3} \\ = \frac{\frac{1}{2}a^2 - 2a + 6}{a - 3} \end{cases}$$

$$\Rightarrow a - 2 = \frac{\frac{1}{2}a^2 - 2a + 6}{a - 3} \quad | \cdot (a - 3)$$

$$\Leftrightarrow (a - 2)(a - 3) = \frac{1}{2}a^2 - 2a + 6$$

$$\Leftrightarrow a^2 - 3a - 2a + 6 = \frac{1}{2}a^2 - 2a + 6$$

$$\Leftrightarrow \frac{1}{2}a^2 - 3a = 0$$

$$\Leftrightarrow a(\frac{1}{2}a - 3) = 0$$

$$\Leftrightarrow a = 0 \text{ oder } \frac{1}{2}a - 3 = 0$$

$$\Leftrightarrow a = 6$$

$$1^\circ a = 0 : z_t = f'(0) = 0 - 2 = -2$$

$$\text{tangentl. : } y - (-1) = -2 \cdot (x - 3) \Leftrightarrow y = -2x + 5$$

$$2^\circ a = 6 : z_t = f'(6) = 6 - 2 = 4$$

$$\text{tangentl. : } y - (-1) = 4(x - 3) \Leftrightarrow y = 4x - 13$$

$$|TA| : z_t = f'(a) = a - 2$$

$$\text{tangentl. : } y - f(a) = (a - 2)(x - a)$$

$$\Leftrightarrow y - (\frac{1}{2}a^2 - 2a + 5) = (a - 2)(x - a)$$

$$(3, -1) \text{ on tangentl. : } -1 - (\frac{1}{2}a^2 - 2a + 5) = (a - 2)(3 - a)$$

$$\Leftrightarrow \dots \Leftrightarrow a = 0 \text{ oder } a = 6$$

$$b) \begin{cases} z_t = f'(a) = a - 2 \end{cases}$$

$$\begin{cases} z_t = \frac{\Delta y}{\Delta x} = \frac{(\frac{1}{2}a^2 - 2a + 5) - 9}{a - 2} \end{cases}$$

$$\Rightarrow a - 2 = \frac{\frac{1}{2}a^2 - 2a - 4}{a - 2} \quad | \cdot (a - 2)$$

$$\Leftrightarrow (a - 2)^2 = \frac{1}{2}a^2 - 2a - 4$$

$$\Leftrightarrow a^2 - 4a + 4 = \frac{1}{2}a^2 - 2a - 4 \quad | \cdot 2$$

$$\Leftrightarrow a^2 - 4a + 16 = 0, D = (-4)^2 - 4 \cdot 1 \cdot 16 = 16 - 64 = -48 < 0$$

kein Lsg. $\Rightarrow$ keine Tangente