

S 110 Nr. 3

a.) Schnitt f mit x -Achse

$$f(x) = 0 = 0,5x^2 - 3x \Rightarrow x \left(\frac{1}{2}x - 3 \right) = 0 \Rightarrow x_{s_1} = \underline{0} \vee x_{s_2} = \underline{6}$$

$$A = \int_0^6 \left| \frac{1}{2}x^2 - 3x \right| dx = \int_0^6 \left(-\frac{1}{2}x^2 + 3x \right) dx = \left[-\frac{1}{2} \cdot \frac{x^3}{3} + 3 \cdot \frac{x^2}{2} \right]_0^6$$
$$= -\frac{1}{2} \cdot \frac{6^3}{3} + \frac{3}{2} \cdot 6^2 = -36 + 54 = \underline{\underline{18}}$$

b.) Schnitt Graph von f mit x -Achse

$$f(x) = 0 \Rightarrow (x-1)^2 - 1 = 0 \Rightarrow (x-1)^2 = 1 \Rightarrow x-1 = \pm \sqrt{1}$$

$$\Rightarrow x_{s_1} = 0 \vee x_{s_2} = 2$$

$$A = \int_0^2 \left| (x-1)^2 - 1 \right| dx = \int_0^2 \left| x^2 - 2x + 1 - 1 \right| dx = \int_0^2 (-x^2 + 2x) dx$$

$$A = \left[-\frac{x^3}{3} + 2 \cdot \frac{x^2}{2} \right]_0^2 = -\frac{8}{3} + 4 = \underline{\underline{\frac{4}{3}}}$$

c.) Schnitt Graph von f mit x -Achse

$$f(x) = 0 \Rightarrow x^4 - 4x^2 = 0 \Rightarrow x^2(x^2 - 4) = 0 \Rightarrow x^2(x-2)(x+2) = 0$$

$$x_{s_1} = -2 \vee x_{s_2} = 0 \vee x_{s_3} = +2 \quad \text{Graph ist symmetrisch zur } y\text{-Achse}$$

$$A = 2 \cdot \int_0^2 |f(x)| dx = 2 \int_0^2 (-x^4 + 4x^2) dx = 2 \left[-\frac{x^5}{5} + 4 \cdot \frac{x^3}{3} \right]_0^2$$
$$= 2 \cdot \left(-\frac{32}{5} + 4 \cdot \frac{8}{3} \right) = \frac{128}{15} \approx \underline{\underline{8,533}}$$