S 145 Nr. 1)

$0 = x(x^2-3x-4) = x(x-4)\cdot(x+1)$ $\quad x_1 = 0$, $x_2 = -1$, $x_3 = 4$ Nullstellen

$\Rightarrow \int_{-1}^{0} f(x)\,dx + \int_{0}^{4} f(x)\,dx$ Integral aufstellen

$F(x) = \frac{1}{4}x^4 - x^3 - 2x^2$ Stammfunktion

Grenzen einsetzen

$F(-1) = -\frac{3}{4}$

$F(0) = 0$

$F(4) = -32$

$\Rightarrow \int_{-1}^{0} f(x)\,dx = F(0) - F(-1) = 0 - (-\frac{3}{4}) = \frac{3}{4}$

$\int_{0}^{4} f(x)\,dx = |F(4) - F(0)| = |-32 - 0| = |-32|$

$= 32$

Fläche bestimmen

$\Rightarrow 32\frac{3}{4}$ FE

fertig :)

2) a) $h(x) = 7x - \boxed{2} \cdot e^{3x-4}$ $\longrightarrow G(x) = e^{3x-4}$

$g(x) = \boxed{3} \cdot e^{3x-4}$

$H(x) = \frac{7}{2} x^2 - \frac{2}{3} e^{3x-4}$

b) $k(x) = \boxed{4} \cdot (5-3x)^3$ $\longrightarrow G(x) = (5-3x)^4$

$g(x) = 4 \cdot (5-3x)^3 \cdot (-3)$

$= \boxed{-12} \cdot (5-3x)^3$

$K(x) = -\frac{1}{3} (5-3x)^4$

3) $\frac{1}{x^2} = \frac{1}{x} \Rightarrow x^2 = x$

$0 = x(x-1)$ $\quad x_1 = 0$

$x_2 = 1$

$\int_0^1 f(x) - g(x) \, dx = \int_0^1 (x^{-2} - x^{-1}) \, dx$

$F(x) = -x^{-1} - \ln x$ $\quad$ $F(0)$ ↯

5) $\sqrt{5x-6} = x \quad | \uparrow^2$

$5x-6 = x^2 \iff x^2 - 5x + 6 = (x-3)(x-2) = 0$

$\int_2^3 (\sqrt{5x-6} - x)\,dx = F(3) - F(2)$

$F(x) = \frac{2}{15}(5x-6)^{3/2} - \frac{1}{2}x^2 \rightarrow \frac{3}{2}\, 5 \cdot (5x-6)^{1/2}$

$F(3) = \frac{2}{15}(9)^{3/2} - \frac{9}{2} = \frac{18}{5} - \frac{9}{2}$

$F(2) = \frac{2}{15}(4)^{3/2} - 2 = \frac{16}{15} - 2$

$\int_2^3 f(x) - g(x)\,dx = \left(\frac{18}{5} - \frac{9}{2}\right) - \left(\frac{16}{15} - 2\right)$

$= \frac{108 - 135 - 32 + 60}{30} = + \frac{1}{30}\ FE$

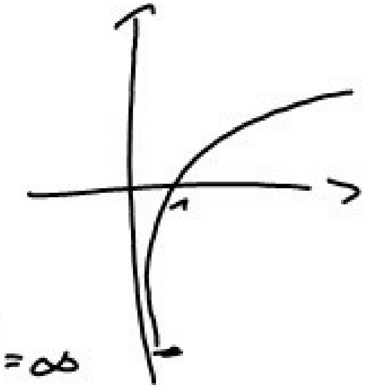
S 149 Nr. 1)

a) $\int_1^{\boxed{\infty}} 2/x^5 \, dx$ => $2 \cdot x^{-5}$ => $F(x) = -\frac{1}{2}x^{-4}$

$F(1) = -1/2$

$\int_1^{\infty} 2/x^5 \, dx = \lim_{x \to \infty} \left(-\frac{1}{2}x^{-4} - \left(-\frac{1}{2}\right)\right) = \left[0 + \frac{1}{2}\right] = \frac{1}{2}$ FE

=> endliches Integral



b) $\int_0^1 2/x \, dx$ => $F(x) = 2 \cdot \ln x = \ln x^2$

$F(1) - F(0)$

=> $\lim_{x \to 0} \left(0 - \ln x^2\right) = [0 - (-\infty)] = \infty$

↳ $\ln 1 = 0$

=> unendliches Integral

2) $\int_{\alpha}^{\infty} (2x-2)^{-2}\,dx$

$$F(x) = -\tfrac{1}{2}\,(2x-2)^{-1} = \frac{1}{2\cdot(2x-2)}$$

$$\lim_{x\to\infty} \left(\frac{1}{4x-4} - \frac{1}{4\cdot\alpha-4}\right) = \left[0 - \frac{1}{4\alpha-4}\right] = \frac{1}{4\alpha-4}$$

$$\frac{1}{4\alpha-4} = \frac{1}{16}$$

$$4\alpha - 4 = 16$$

$$4\alpha = 20$$

$$\alpha = 5$$

$$\int \underbrace{x^2}_{g} \cdot \underbrace{\cos(x)}_{f'}\, dx \qquad \boxed{\int f' \cdot g = f \cdot g - \int f \cdot g'}$$

$$f'(x) = \cos(x) \rightarrow f(x) = \sin(x)$$
$$g(x) = x^2 \rightarrow g'(x) = 2x$$

$$\sin(x) \cdot x^2 - \int 2x \cdot \sin x \, dx = \boxed{\sin x \cdot x^2 - 2 \cdot \int \underbrace{x}_{g} \cdot \underbrace{\sin x}_{f'} \, dx}$$

$$\int x \cdot \sin x \, dx$$

$$f'(x) = \sin(x) \longrightarrow f(x) = -\cos(x)$$
$$g(x) = x \longrightarrow g'(x) = 1$$

$$x \cdot (-\cos(x)) - \int 1 \cdot (-\cos(x))\, dx$$
$$\boxed{-x \cdot \cos x + \int \cos(x)\, dx}$$

$$\int x^2 \cdot \cos(x)\, dx = x^2 \cdot \sin x - 2 \cdot \left[-x \cdot \cos x + \int \cos x \, dx \right]$$

$$= x^2 \cdot \sin x + 2x \cdot \cos x - 2 \cdot \sin x + C$$