Übungsaufgaben

a)

$$f(x) = x \cdot e^x$$

$$\int_{-1}^{1} f(x)dx$$

$$u = x;\ v = e^x;$$

$$u' = 1;\ v' = e^x;$$

$$\int_{-1}^{1} (x \cdot e^x)dx = \Big[x \cdot e^x\Big]_{-1}^{1} - \int_{-1}^{1} (1 \cdot e^x)dx$$

$$\Big[x \cdot e^x - e^x\Big]_{-1}^{1}$$

$$F(1) - F(-1)$$

$$\Leftrightarrow 1 \cdot e^1 - e^1 - (-1 \cdot e^{-1} - e^{-1})$$

$$\Leftrightarrow 0 - (-e^{-1} - e^{-1})$$

$$\Leftrightarrow 0 + e^{-1} - e^{-1}$$

$$\Leftrightarrow 0$$

b)

$$f(x) = x \cdot ln(x)$$
$$\int_1^2 f(x)dx$$
$$u = ln(x);\ v = \frac{x^2}{2};$$
$$u' = x^{-1};\ v' = x;$$
$$\int_1^2 (x \cdot ln(x))dx = \left[ln(x) \cdot \frac{x^2}{2}\right]_1^2 - \int_1^2 (x^{-1} \cdot \frac{x^2}{2})dx$$
$$\left[ln(x) \cdot \frac{x^2}{2} - x^{-1} \cdot \frac{x^2}{2}\right]_1^2$$
$$F(2) - F(1)$$
$$\Leftrightarrow ln(2) \cdot 2 - 1^{-1} \cdot \frac{1}{2}$$
$$\Leftrightarrow ln(2) \cdot 2 - 1 \cdot \frac{1}{2}$$
$$\Leftrightarrow ln(2) \cdot 2 - \frac{1}{2}$$

c)

$$f(x) = (2x + 1) \cdot e^{2x}$$
$$\int_1^2 f(x)dx$$
$$u = 2x + 1;\ u' = 2$$
$$v = \frac{1}{2} \cdot e^{2x};\ v' = e^{2x}$$
$$\int_1^2 (2x \cdot \frac{1}{2} \cdot e^{2x})dx = \left[x \cdot e^{2x}\right]_1^2 - \int_1^2 (e^{2x})dx$$
$$\left[x \cdot e^{2x} - e^{2x}\right]_1^2$$
$$F()$$