Indefinite integral example

Calculate indefinite integral of function below

$$\int x^2 \cdot e^x \cdot dx$$

Theorem about integration by parts will be applied

$$\int u \cdot dv = u \cdot v - \int v \cdot du$$

$$\int x^2 \cdot e^x \cdot dx = \begin{Bmatrix} u = x^2 & v = e^x \\ du = 2 \cdot x & dv = e^x \end{Bmatrix}$$

$$x^2 \cdot e^x - \int 2 \cdot x \cdot e^x \cdot dx$$

$$x^2 \cdot e^x - 2 \cdot \int x \cdot e^x \cdot dx$$

Theorem about integration by parts will be applied again for expression under integral

$$\int x \cdot e^x \cdot dx = \begin{Bmatrix} u1 = x & v1 = e^x \\ du1 = 1 & dv1 = e^x \end{Bmatrix}$$

$$x^2 \cdot e^x - 2 \cdot \left[x \cdot e^x - \int e^x \cdot dx \right]$$

$$x^2 \cdot e^x - 2 \cdot [x \cdot e^x - e^x + C_1]$$

$$x^2 \cdot e^x - 2 \cdot x \cdot e^x + 2 \cdot e^x - 2 \cdot C_1$$

$$-2 \cdot C_1 = C$$

$$x^2 \cdot e^x - 2 \cdot x \cdot e^x + 2 \cdot e^x + C$$

$$mb(x) = x^2 \cdot e^x - 2 \cdot x \cdot e^x + 2 \cdot e^x + C$$

Derivative will be calculated to check correctness of calculated integral.

$$\frac{d}{dx} mb(x) = 2 \cdot x \cdot e^x + x^2 \cdot e^x - 2 \cdot e^x - 2 \cdot x \cdot e^x + 2 \cdot e^x$$

$$\frac{d}{dx} mb(x) = x^2 \cdot e^x \rightarrow (OK)$$