

Quiz 4: Section 7.2, Problem 9

Integrate:

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

We start by using integration by parts:

$$\begin{array}{ll} u = x^2 & v = e^x \\ du = 2x dx & dv = e^x dx \end{array}$$

We then get

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

For $\int x e^x dx$ we again use integration by parts:

$$\begin{array}{ll} u = x & v = e^x \\ du = 1 dx & dv = e^x dx \end{array}$$

We then get

$$x^2 e^x - 2 \int x e^x dx = x^2 e^x - 2 \left(x e^x - \int e^x dx \right) = x^2 e^x - 2(x e^x - e^x) + C$$