PROOF OF FORMULA 2.322.2

$$\int x^2 e^{ax} dx = e^{ax}\left(\frac{x^2}{a} - \frac{2x}{a^2} + \frac{2}{a^3}\right)$$

Formula 2.321.2 states that

$$\int x^n e^{ax}\, dx = e^{ax}\left(\sum_{k=0}^{n} \frac{(-1)^k k! \binom{n}{k}}{a^{k+1}} x^{n-k}\right).$$

The case $n = 2$ produces the requested evaluation.