What is the integral of $3^x e^x$?

**SOLUTION**

$\int 3^x e^x dx = \int 3^x d(e^x) = 3^x e^x - \int e^x d(3^x) = 3^x e^x - \int e^x 3^x \ln 3 dx = 3^x e^x - \ln 3 \int e^x 3^x dx$.
Denote $I = \int 3^x e^x dx$, then $I = 3^x e^x - \ln 3 I$, from where $I + \ln 3 I = 3^x e^x$.

$$I(1 + \ln 3) = 3^x e^x$$

and

$$I = \frac{3^x e^x}{\ln 3 + 1} + C.$$

**ANSWER**

$\int 3^x e^x dx = \dfrac{3^x e^x}{\ln 3 + 1} + C.$