Consider the following properties of the Laplace transform:

(i) \( \mathcal{L}\{e^{ct} f(t)\}(s) = F(s - c) \)

(ii) \( \mathcal{L}\{t^n f(t)\}(s) = (-1)^n F^{(n)}(s) \)

We also know that \( \mathcal{L}\{e^{at}\}(s) = \frac{1}{s-a} \), and \( \mathcal{L}\{t^n\}(s) = \frac{n!}{s^{n+1}} \), and \( \mathcal{L}\{\cos bt\}(s) = \frac{s}{s^2 + b^2} \).

1. Compute the Laplace transform of \( t^2 e^{3t} \) using Property (i).

2. Compute the Laplace transform of \( t^2 e^{3t} \) using Property (ii).
3. Compute the Laplace transform of $e^{2t} \cos 3t$. 