

MathQuest: Differential Equations

Linear Operators

1. Which differential operator is the appropriate one for the differential equation $ty'' + 2y' + ty = e^t$?
 - (a) $t \frac{d^2}{dt^2} + 2 \frac{d}{dt} + t$
 - (b) $t \frac{d^2}{dt^2} + 2 \frac{d}{dt} + t - e^t$
 - (c) $\frac{d^2}{dt^2}t + 2 \frac{d}{dt} + t$
 - (d) $\frac{d^2}{dt^2} + 2 \frac{d}{dt} + 1$
 - (e) None of the above

2. Let $L = t^2 \frac{d^2}{dt^2} + 2t \frac{d}{dt} + 2$ be a differential operator. Evaluate $L[t^3]$.
 - (a) 0
 - (b) $14t^3$
 - (c) $2 + 12t^3$
 - (d) $6t^3 + 6t^2 + 2$