

1. Use the formula $y = v(t)e^{2t}$ to express the differential equation $y' - 2y = t$ as a differential equation in terms of t and $v(t)$.

2. For what value of the constant k will the change of variables formula $y = v(t)e^{kt}$ transform the differential equation $y' + 3y = e^t$ into a differential equation that contains no $v(t)$ term?

3. Use the formula $y = v(t)e^{2t}$ to express the differential equation $y'' - y' - 2y = 0$ as a differential equation in terms of t and $v(t)$.

4. Use the formula $y = v(t)t$ to express the differential equation $t^2y'' - ty' + y = 0$ as a differential equation in terms of t and $v(t)$.

5. Use the formula $v(t) = y'(t)$ to express the differential equation $y'' = ty'$ as a differential equation in terms of t and $v(t)$.

6. Use the formula $v(y) = y'(t)$ to express the differential equation $y'' = y'/y^2$ as a differential equation in terms of y and $v(y)$.