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).