1. Determine the solution to the following initial value problem.

$$y'' - 2y' + 17y = 0 \qquad y(0) = 1 \qquad y'(0) = 2$$

Solution: The characteristic equation is $r^2 - 2r + 17 = 0$, which has solutions

$$r = 1 \pm 4i.$$

Thus the general solution is

$$y(t) = c_1 e^t \cos(4t) + c_2 e^t \sin(4t).$$

The first initial condition gives us an equation $1 = c_1$.

The second initial condition gives us the equation $2 = c_1 + 4c_2$.

Therefore $c_2 = \frac{1}{4}$.

The final solution is

$$y(t) = e^t \cos(4t) + \frac{1}{4} e^t \sin(4t).$$