Separate the following second order differential equation into two first order differential equations:

$$\frac{\mathrm{d}^2y}{\mathrm{d}t^2} + 5\left(\frac{\mathrm{d}y}{\mathrm{d}t}\right)^2 - 6y + e^{\sin(t)} = 0, \quad \frac{1}{g}\frac{\mathrm{d}^2h}{\mathrm{d}t^2} = \frac{T}{w} - 1 - \frac{0.008}{w}\left(\frac{\mathrm{d}h}{\mathrm{d}t}\right)^2.$$

Define $\vec{u}$ and $\dfrac{\mathrm{d}\vec{u}}{\mathrm{d}t}$ for the ODE's above and write pseudo code to define a `dudt` function similar to the previous lecture assignment for each ODE.