EXERCISE 9.1 (Part 1)

1. (1.) $y'' = t + y + y'$

$u_1' = u_2$

$u_2' = t + u_1 + u_2$

(2.) $y''' = y'' + ty$

$u_1' = u_2$

$u_2' = u_3$

$u_3' = u_3 + tu_1$

(3.) $y''' = y'' - 2y' + y - t + 1$

$u_1' = u_2$

$u_2' = u_3$

$u_3' = u_3 - 2u_2 + u_1 - t + 1$

Exercise 9.2

b.) (1) $y'' = y'(1 - y^2) - y$

$u_1' = u_2$

$u_2' = u_2(1 - (u_1)^2) - u_1$

(2.) $y''' = -yy''$

$u_1' = u_2$

$u_2' = u_3$

$u_3' = -u_1 u_3$

(3) $y_1'' = -GM y_1 / (y_1^2 + y_2^2)^{3/2}$ $\quad y_2'' = -GM y_2 / ((y_1^2 + y_2^2)^{3/2}$

$u_1' = u_2$

$u_2' = -GM u_1 / ((u_1)^2 + (u_3)^2)^{3/2}$ $\quad u_3' = u_4$

$u_4' = -GM u_3 / (u_1^2 + u_3^2)^{3/2}$