Math 4B Practice Midterm 1

Name: _____

Determine the order of the following equations involving $y(x)$.   (*1 pt ea.*)

1. _____ $y^{(4)} + xy^{(5)} = x^6$

2. _____ $y'' - \log(x) = 5y'''$

3. _____ $y'e^y + ye^{y'} = 0$

4. _____ $\sin(y') = y''$

5. _____ $x^2 \log(y) - y' = \cos(y)$

Solve each equation for $u(t)$.   (*3 pt ea.*)

6. _____ $u' = e^{-u}, \ \ u(e) = 1, \ t > 0$

7. _____ $uu' + t^2u^2 = 0, \ \ u(-3) = e^9, \ u > 0$

8. _____ $u = u' + t, \ \ u(0) = -1$

9. _____ $u' = \dfrac{u}{2u - t}, \ \ u(1) = 1, \ t > 0$

10. _____ $u' + t^{-1}u + t^{-2} = 0, \ \ u(1) = 0, \ t > 0$

Find the equilibrium solutions of $y(t)$ and indicate if each is stable, unstable, or semistable.   (*5 pts ea.*)

11. _____ $y' = y^2 - y$

12. _____ $y' = y^3 - y^2$

Extra Credit Question