Name:_____   Score:_____
Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(7pts) Use the method of separation of variables to find the general solution to the equation $u' = 2 - ku$ where k is a constant. (Must show steps in deriving the solution.)

2(8pts) For the autonomous differential equation $u' = 3u^2(2 - u)$,

    (a) Find all equilibrium solutions.

    (b) Sketch the graph of the rate of change v.s. u (for which graphing calculators are allowed), and sketch the phase line.

    (c) Sketch a solution portrait of the equations, including a few typical solutions and all equilibrium solutions.

    (d) Classify the stability of the equilibrium solutions as sink, source, or node.

END