Suggested problems 12

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1. Consider the autonomous differential equation

$$y' = y(y - 5)(10 - y).$$

   (a) Find all equilibrium solutions.

   (b) Classify the stability of each equilibrium solution. Justify your answer.

   (c) If $y(5000) = 6$, what is $\lim_{t \to \infty} y(t)$?(You do **not** need to solve the equation to find the answer).

   (d) If $y(7) = 10$, find $y(21)$. (You do **not** need to solve the equation to find the answer).

2. Consider the autonomous differential equation

$$y' = 9y^2 - y^4 = y^2(3 - y)(3 + y).$$

   (a) Find all equilibrium solutions.

   (b) Classify the stability of each equilibrium solution. Justify your answer.

   (c) If $y(\frac{22}{7}) = \pi$, what is $\lim_{t \to \infty} y(t)$?(You do **not** need to solve the equation to find the answer).

   (d) If $y(2\pi) = -3$, find $y(t)$. (You do **not** need to solve the equation to find the answer).