

Autonomous Differential Equations

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For each of the following differential equations,

- (a) sketch a slope field
- (b) sketch a set of solutions that represents all possible behaviors for different initial values
- (c) write a sentence summarizing the different behaviors
- (d) sketch a phase line diagram
- (e) solve the differential equation explicitly if possible.

1. $x' = 3x + 2$

2. $x' = x^2 + 1$

3. $x' = x^2 - 1$

4. $x' = x^2(x - 1)$

5. $x' = px + q$, p , q constants (you may have to break your answer into different cases)

6. $x' = a(x - b)$, a , b constants