

Worksheet 8  
10/17/2023

1. Consider the initial-value problem  $y' = x + y^2$ ,  $y(-1) = 0$ . Use Euler's method to estimate  $y(-0.9)$ ,  $y(-0.8)$ ,  $y(-0.7)$ ,  $y(-0.6)$ ,  $y(-0.5)$ .

2. Identify the direction field corresponding to each given differential equation. See the figures on the next page.

\_\_\_\_\_  $y' = ty^2$

\_\_\_\_\_  $y' = (t - 1)y$

\_\_\_\_\_  $y' = \sin(ty)$

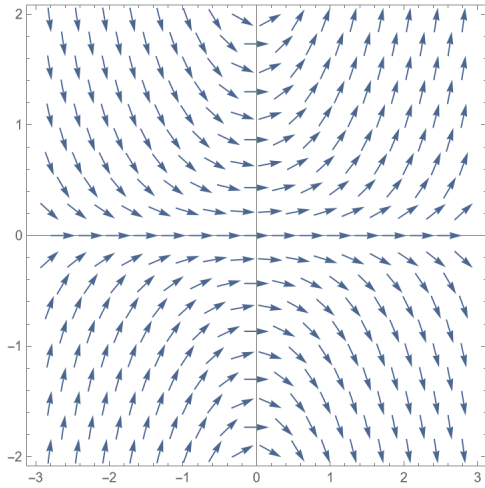
\_\_\_\_\_  $y' = ty$

3. Suppose a population  $P(t)$  satisfies

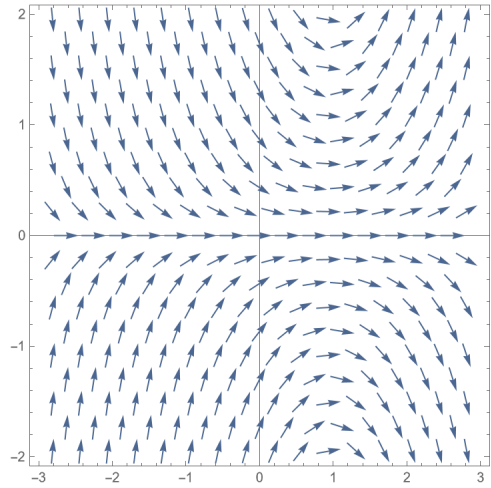
$$\frac{dP}{dt} = 0.4P - 0.001P^2, \quad P(0) = 50$$

where  $t$  is measured in years.

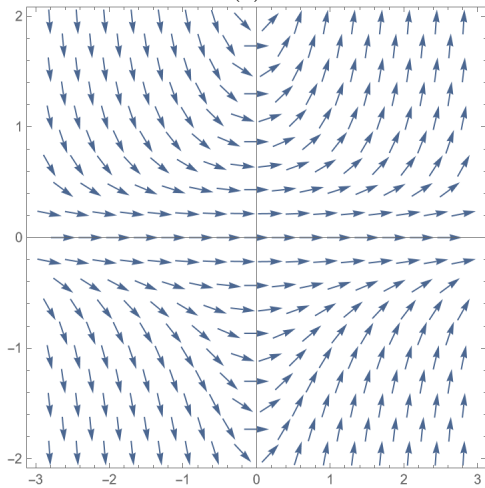
- (a) What is the carrying capacity?
- (b) What is  $P'(0)$ ?
- (c) When will the population reach 50% of the carrying capacity?



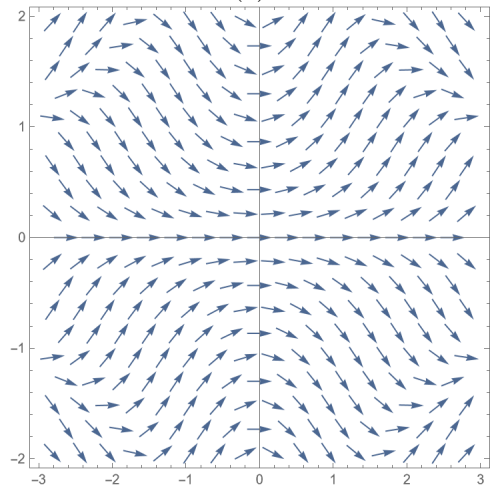
(a)



(b)



(c)



(d)