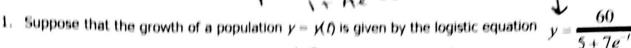


750= 1000 1+0PAES

1 t = 8.89



a) What is the population at time t=0? 
$$\frac{60}{5+3} = \frac{60}{12} = \frac{5}{12}$$

2. Suppose that the growth of a population 
$$y = y(t)$$
 is given by the logistic equation

$$y = \frac{1000}{1 + 999e^{-0.97}}$$

$$y = \frac{1000}{1 + 999e^{-0.97}} = \frac{1000}{1 + 999} = \frac{1000}{1000} = \boxed{1}$$

a) What is the population at time 
$$t=0$$
?

d) When does the population reach 75% of the carrying capacity? 
$$75\%$$
 of  $1000 = 750$ 

e) Write an initial value differential equation problem whose answer would above given logistic equation. 
$$(1 - P/\sqrt{500})$$

3. Suppose that a population y(t) grows in accordance with the logistic model 
$$\frac{dy}{dt} = 10(1 - 0.1y)y$$

$$\frac{dy}{dt} = 10y\left(1 - \frac{4y}{t}\right)$$

a) What is the carrying capacity? (Hint: When a logistic function approaches capacity, the rate slows down and approaches zero. For what 
$$y$$
-values does  $\frac{dy}{dt} = 0$ )  $\sqrt{100}$ 

c) For what value of y is the population growing most rapidly? (Hint: You find the maximum of any function by finding its derivative and critical points. The derivative of 
$$\frac{dy}{dt}$$
 is  $\frac{d^2y}{dt^2}$ . In other words, find the 2<sup>nd</sup> derivative. Where it equals zero is where  $\frac{dy}{dt}$  has its maximum and minimums.)

find the 2<sup>nd</sup> derivative. Where it equals zero is where 
$$\frac{dy}{dt}$$
 has its maximum and minimums.)

4. Suppose that a population y(t) grows in accordance with the logistic model

a) What is the carrying capacity? (See hint for 3a)  $\frac{dy}{dt} = 50y - 0.001y^2$