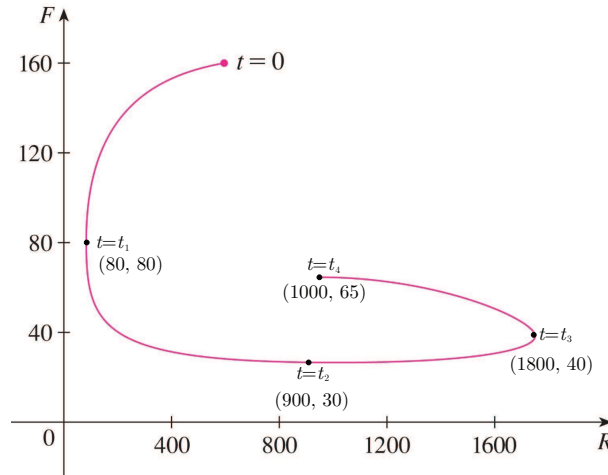


Calculus II, Section 9.6, #6  
 Predator-Prey Systems

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A phase trajectory is shown for a population of rabbits ( $R$ ) and foxes ( $F$ ).<sup>1</sup>

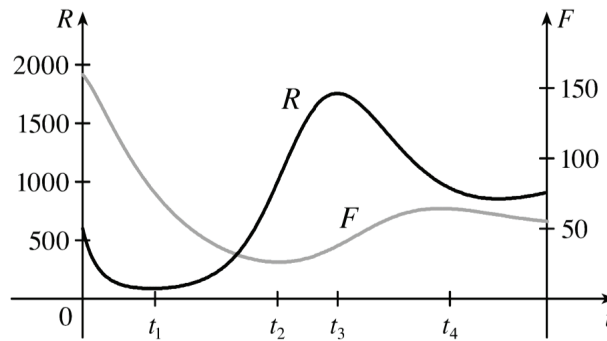


- (a) Describe how each population changes as time goes by.

At  $t = 0$ , there are about 600 rabbits and 160 foxes. The rabbit population begins to decrease rapidly to a minimum of about 80 while the fox population decreases slowly at first and then more rapidly. When the rabbit population hits its minimum of about 80 at  $t_1$ , the fox population is decreasing very rapidly. The rabbit population then begins to grow slowly at first and then very rapidly while the fox population remains near its minimum of about 30 at  $t_2$ . The fox population then begins to increase slowly while the rabbit population continues to increase to its maximum of about 1800 at  $t_3$ . As the fox population increases further to about 65, the rabbit population begins to decrease to 1000 at  $t_4$ .

- (b) Use your description to make a rough sketch of the graphs of  $R$  and  $F$  as functions of time.

Note that all values are approximate.



<sup>1</sup>Stewart, *Calculus, Early Transcendentals*, p. 632, #6.