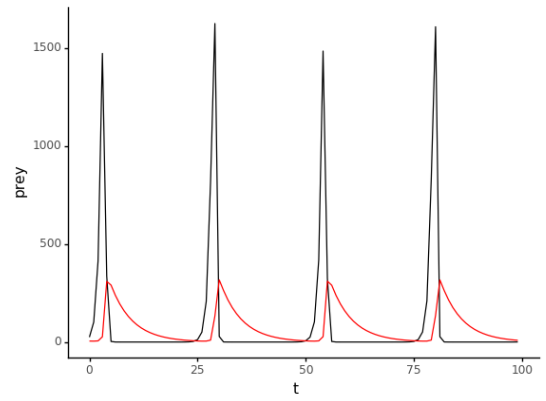
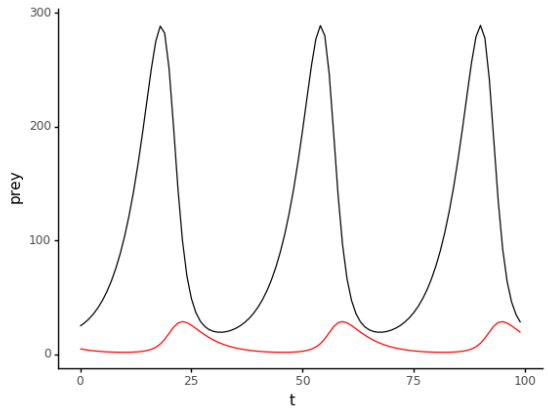
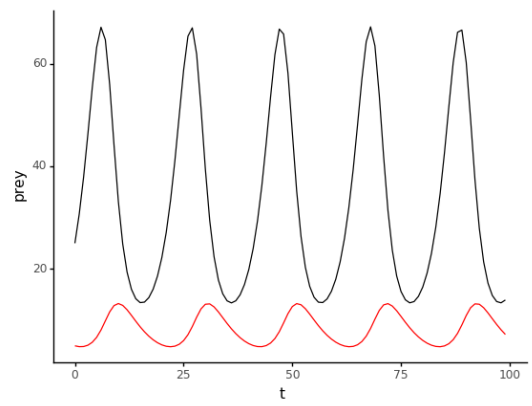
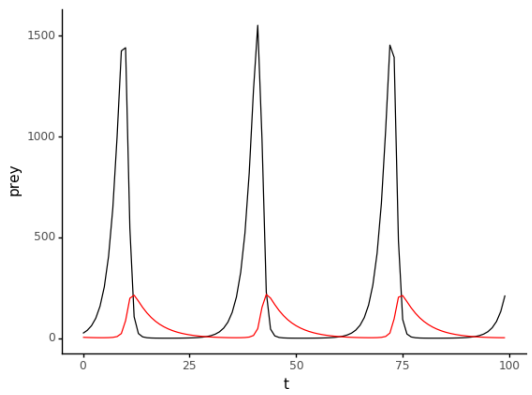
Lotka-Volterra Plot Additional Questions

In all cases, the predator population is defined by the red line and the prey population is defined by the red line.

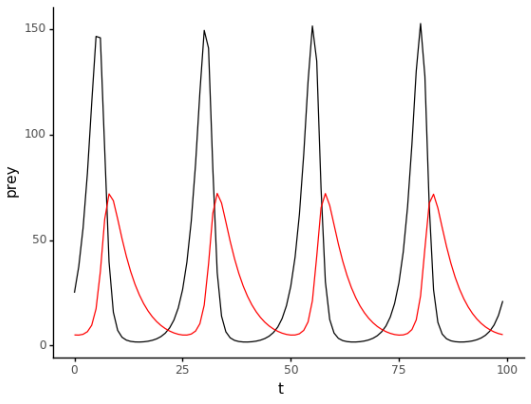
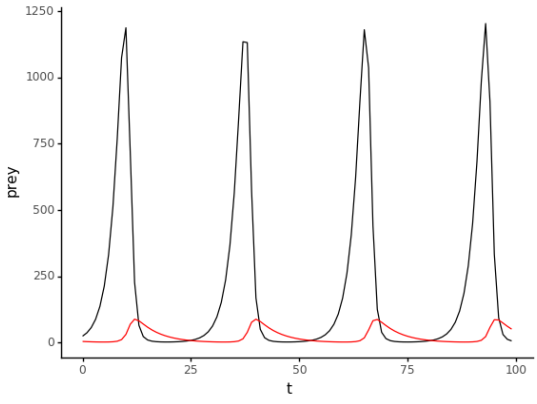
1. What can you say about the "role" of each of the parameters and what is the relationship between the parameters and predator-prey cycle length
    a. Prey Birth Rate
        i. This controls how high the maximum populations of predators and prey are at each of their peaks, and how sharp each of the population increases and decreases (the peaks) are (especially those of the prey). It also controls the length of the predator-prey cycle. As the prey birth rate increases, the prey population gains and falls more rapidly, and the peak populations for predators and prey increase. There are also more cycles in a given time period with a higher prey birth rate, indicating that a high prey birth rate shortens the predator-prey cycle length.

Triple the Prey Birth Rate	Half the Prey Birth Rate
	

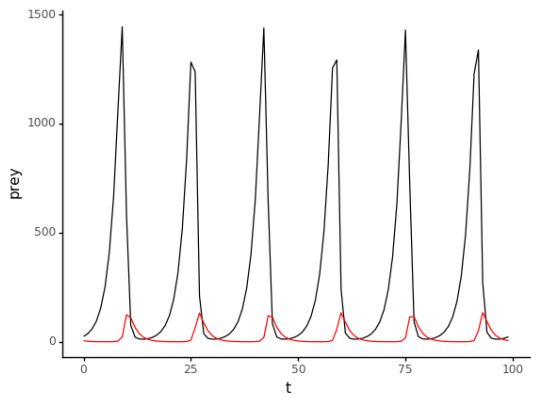
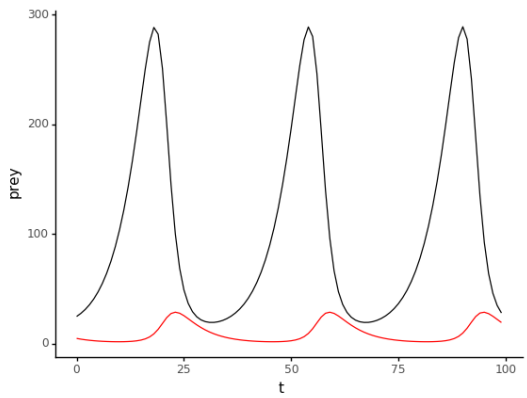
b. Predator attack rate
    i. This controls the maximum and minimum populations of predator and prey in each cycle, the frequency at which the predator-prey cycle occurs, and how sharp each of the population increases and decreases are. A greater predator attack rate results in lower maximum populations and higher minimum populations for both predator and prey. It also results in more cycles of growth and decline for the two populations and more gradual growth and decline.

Triple the Predator Attack Rate	Half the Predator Attack Rate
	

c. Conversion efficiency
    i. This parameter pretty much exclusively controls the peaks of the prey population at each cycle. Greater conversion efficiency results in a lower maximum prey population. It has only a slight effect on the predator-prey cycle length. A greater conversion efficiency has a slightly smaller cycle length, thus has more cycles per time period

Triple Conversion Efficiency of Prey to Predators	Half Conversion Efficiency of Prey to Predators
	

d. Predator death rate
    i. The predator death rate controls the maximum prey population in each cycle and controls the length of each predator-prey cycle. A greater predator death rate results in greater peak prey populations and more cycles in a given time period (less time per cycle).

Triple the Predator Death Rate	Half the Predator Death Rate
	

2. What can you say about the role of predators in the simulations
    a. The predator population greatly influences the prey population, and thus indirectly has a limiting effect on itself. As the predator population increases, it leads to a sharp decline in the prey population, because an increase in predator population indicates more predators are present to attack prey, reducing the prey population. The reduction in prey will lead to a subsequent decline in the predator population because the predators now lack sufficient prey to feed on, and will die. With the predator population back to its initial low state, the prey population can increase as there are few predators to feed on and attack the prey, and this increase in the prey population will allow the predator population to once again increase as the cycle repeats. The initial predator and prey populations do not have a great impact on the cycle (within reason), because the cycle will progress regardless of where in the cycle the predator and prey populations start (low predator/high prey, low predator/low prey, high predator/high prey, or high predator/low prey).