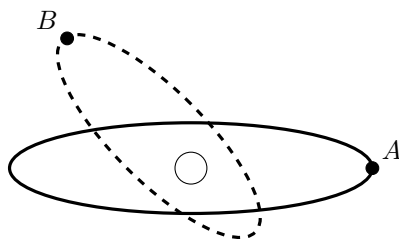
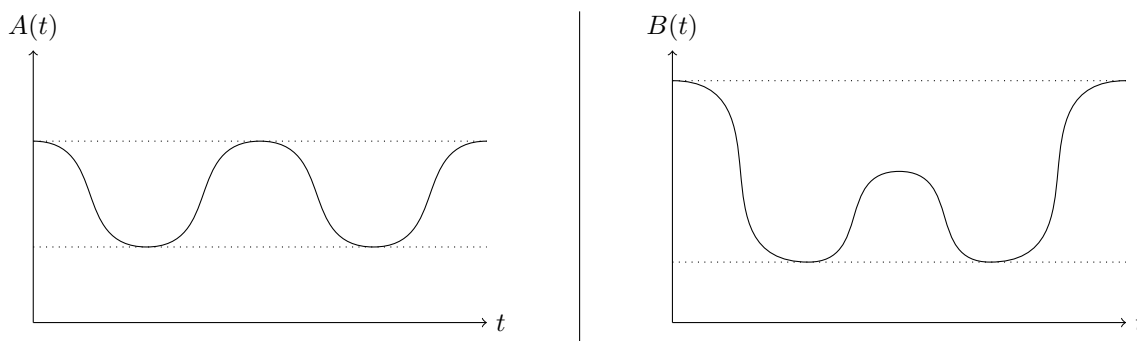


4. [11 points] The comets A and B each orbit the sun in an ellipse, as illustrated in the diagram below. Let $A(t)$ be the distance (in millions of miles) between comet A and the sun and $B(t)$ the distance (in millions of miles) between comet B and the sun t years after June 12, 2013.



It takes 7 years for comet A to complete a full orbit (i.e. return to its initial position), and 20 years for comet B to do the same. The functions $A(t)$ and $B(t)$ have been graphed for the time it takes the comets to travel through a complete orbit and return to their starting positions.



Note that the graphs are *not* drawn to the same scale. You do not need to show any work for this problem.

- a. [2 points] What is the period of the function $A(t)$? Write your answer *in the space provided*.

The period of $A(t)$ is 3.5 years

- b. [2 points] What is the period of the function $B(t)$? Write your answer *in the space provided*.

The period of $B(t)$ is 20 years

- c. [3 points] The closest that comet A gets to the sun is 1.75 million miles, and the function $A(t)$ has midline $y = 4.25$. What is the furthest that comet A gets from the sun? Write your answer *in the space provided*, and **include units**.

The furthest that comet A gets is 6.75 million miles.

- d. [4 points] Comet C (not shown above) also orbits the sun in an ellipse. Let $C(t)$ be the distance (in millions of miles) from comet C to the sun t years after June 12, 2013.

The function $C(t)$ is periodic with period 4. Between $t = 0$ and $t = 4$, comet C is the closest to the sun at time $t = 3$. Which of the following **must** be true? **Circle** your answer(s) from the options listed; if none of the options are correct, circle NONE OF THESE.

$C(27) = C(32)$

$C(3) > C(4)$

$C(t)$ is the largest at $t = 1$

$C(28) = C(32)$

$C(11) \leq C(2)$

NONE OF THESE