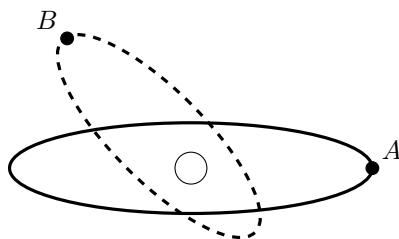**4.** [11 points] The comets $A$ and $B$ each orbit the sun in an ellipse, as illustrated in the diagram below. Let $A(t)$ be the distance (in millions of miles) between comet $A$ and the sun and $B(t)$ the distance (in millions of miles) between comet $B$ and the sun $t$ years after June 12, 2013.



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.*
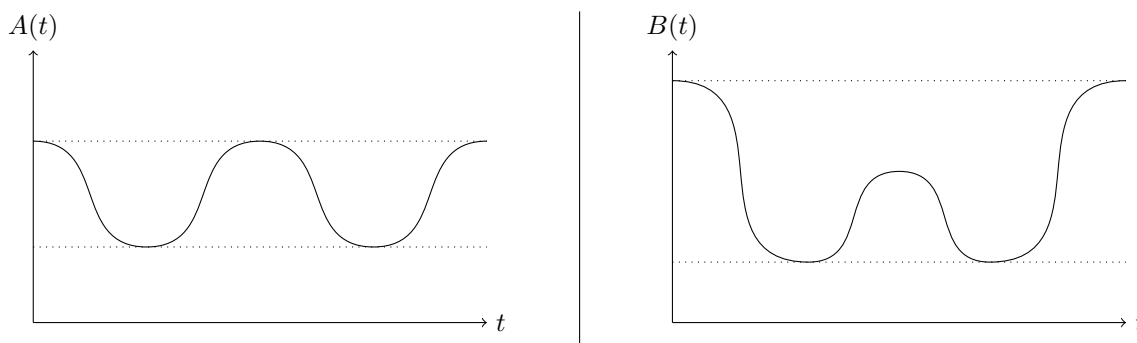


Note that **the graphs are *not* drawn to the same scale**. **You do not need to show any work for this problem**.

**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* _____

**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* _____

**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* _____.

**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.

$C(27) = C(32)$ $\qquad\qquad$ $C(3) > C(4)$ $\qquad\qquad$ $C(t)$ *is the largest at $t = 1$*

$C(28) = C(32)$ $\qquad\qquad$ $C(11) \leq C(2)$ $\qquad\qquad$ NONE OF THESE