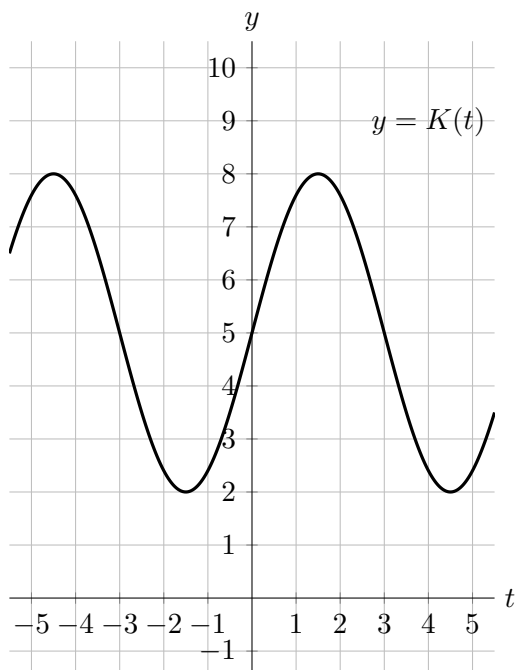**5.** [12 points] The graph of a sinusoidal function $y = K(t)$ is given below.

a. [7 points] Find the following.

(i) The amplitude of $K(t)$.

(ii) The midline of $K(t)$.

(iii) The period of $K(t)$.

(iv) A formula for $K(t)$.

b. [5 points] Find the first **three** positive values of t for which $K(t) = 7$. Give your answer in exact form.

6. [11 points] A duck in swimming in circles along the outer edge of a circular fountain in a park. The duck is 2 feet from the center of the fountain and swimming at a constant speed in a counter-clockwise direction. There is a sidewalk running north-south that passes 3 feet away from the fountain, as shown in the diagram below (which may not be drawn to scale). The duck starts at point A that is closest to the sidewalk. After 4 seconds, the duck is at the point B.
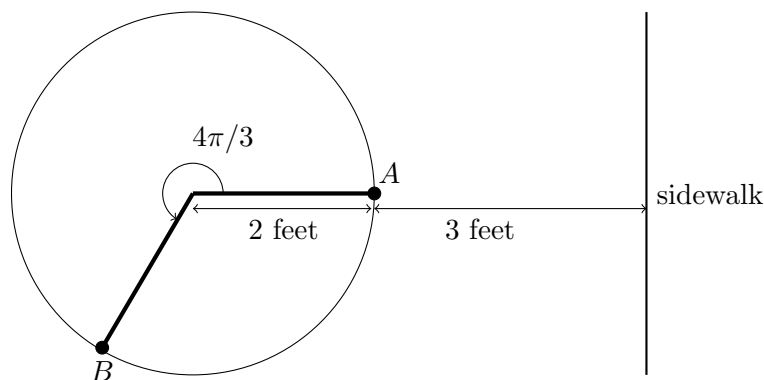
a. [2 points] How long does it take for the duck to make one full lap around the fountain? Include units.

b. [3 points] How far did the duck travel along the circumference of the fountain between point A and point B? Give your answer in exact form and include units.

c. [6 points] Find a function $D(t)$ that gives the (horizontal) distance in feet between the duck and the sidewalk t seconds after the duck starts swimming.