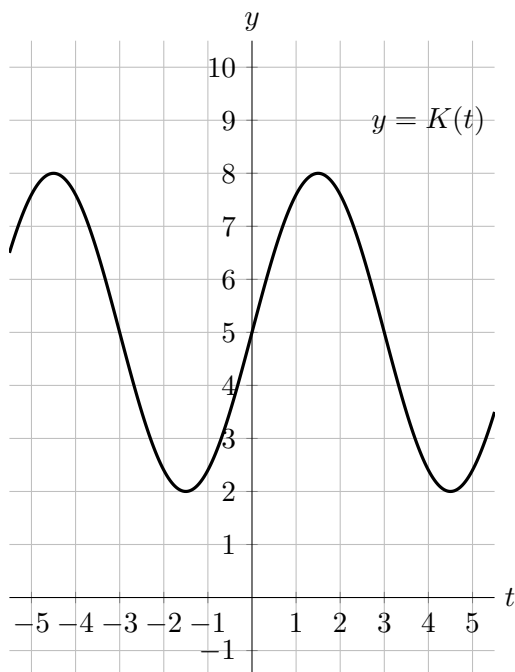**d.** [3 points] Let $T(k)$ be the total revenue, in **dollars** of both Mia and Jonathan k **minutes** after 9 am. Find a formula for $T(k)$ in terms of M and/or J.

Solution: $T(k) = 100(M(k/60) + J(k/60))$.

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

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

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 $K(t)$.

Solution:

  (i) $(8-2)/2 = 3$

  (ii) $y = 5$

  (iii) 6

  (iv) Note that the function starts at its midline at $t = 0$ and increases to the right, so we can use $\sin(t)$ without a horizontal shift or a reflections. Using the values we've found above, we get $3\sin((2\pi/6)t) + 5$.

Solution: We want to know when

$$3\sin((2\pi/6)t) + 5 = 7.$$

Subtracting 5 from both sides, dividing by 3, and taking arcsin, we find

$$(2\pi/6)t = \arcsin(2/3)$$

which gives us

$$t = \frac{3}{\pi}\arcsin(2/3)$$

This is the first solution. We can find the second by using symmetries:

$$t = 3 - \frac{3}{\pi}\arcsin(2/3).$$

The third can be found by adding one period to the first solution:

$$t = 6 + \frac{3}{\pi}\arcsin(2/3).$$