5. [12 points] Several high-ranking Illuminati officials are relaxing while counting their money. There is so much money to count that the process takes many hours. The rate (in millions of dollars per hour) at which they count the money is given by the function $M(t)$, where t is the number of hours since they began counting. Several values of this function are given in the table below.

t (hours)	0	2	4	6	10	14
$M(t)$ (million \$/hour)	6	7	13	15	11	5

Note: The function $M(t)$ is continuous. Between each of the values of t given in the table, the function $M(t)$ is always increasing or always decreasing.

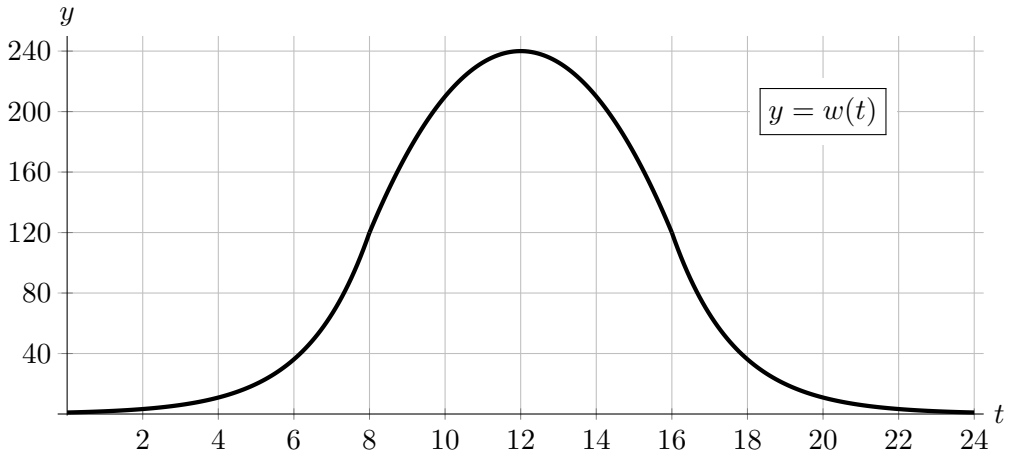
a. [2 points] Write, but do **not** evaluate, a definite integral that gives the total amount of money, in millions of dollars, the officials counted from the time they started until the time when they were counting the money the fastest.

b. [3 points] Write out the terms of a left Riemann sum with 3 equal subdivisions to estimate the integral from (a). Does this sum give an overestimate or an underestimate of the integral?

c. [4 points] Based on the data provided, write a sum that gives the best possible **overestimate** for the total amount of money, in millions of dollars, counted during the first 14 hours of counting.

d. [3 points] What is the difference, in millions of dollars, between the best possible overestimate and the best possible underestimate for the total amount of money counted during the first 14 hours of counting?

5. [10 points] Suppose that the function $w(t)$ shown in the graph below models the power, in kilowatts, that is harvested at a particular solar panel installation in northern Norway at time t, where t is measured in hours after midnight on a typical summer day.



Consider the function W defined by

$$W(x) = \int_{2x}^{2x+4} w(t)\,dt.$$

Be sure to show your work very carefully on all parts of this problem.

a. [3 points] Estimate $W(4)$. In the context of this problem, what are the units on $W(4)$?

Answer: $W(4) \approx$ _____ **Units:** _____

b. [4 points] Estimate $W'(4)$. In the context of this problem, what are the units on $W'(4)$?

Answer: $W'(4) \approx$ _____ **Units:** _____

c. [3 points] Estimate the value(s) of x at which $W(x)$ attains its maximum value on the interval $0 \le x \le 8$. If there are no such values, explain why.