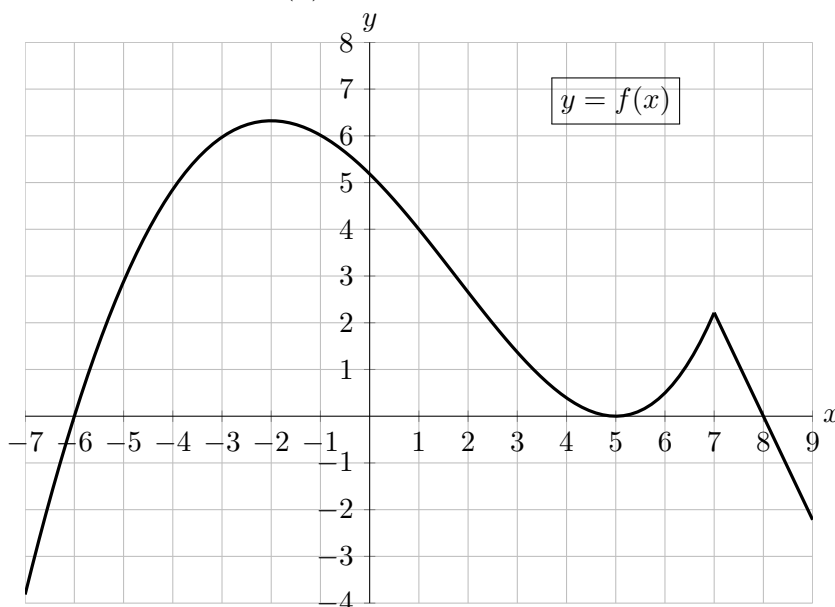


3. [10 points] Consider the function $f(x)$ graphed below.



- a. [3 points] Let $F(x) = \int_0^x f(t) dt$. Find the x -coordinates of all local extrema of $F(x)$ and classify them as local maxima or local minima. Write “NONE” if there are none.

Answer: Local maxima at $x =$ 8

Answer: Local minima at $x =$ -6

- b. [3 points] Let $G(x) = \int_{3x}^{x^2} f(t) dt$. Compute $G'(-1)$.

Solution: Using the second fundamental theorem of calculus we compute

$$G'(x) = f(x^2) \cdot 2x - f(3x) \cdot 3.$$

Therefore,

$$G'(-1) = -2f(1) - 3f(-3) = -26$$

Answer: $G'(-1) =$ -26

- c. [2 points] Which approximation method is guaranteed to underestimate $\int_{-4}^0 f(x) dx$?

MID

TRAP

LEFT

RIGHT

NONE OF THESE

- d. [2 points] Which approximation method is guaranteed to overestimate $\int_{-1}^5 f(x) dx$?

MID

TRAP

LEFT

RIGHT

NONE OF THESE