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 \( x = \boxed{8} \)

Answer: Local minima at \( x = \boxed{-6} \)

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: \( G'(-1) = \boxed{-26} \)

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 \( \int_{-1}^5 f(x) \, dx \)?

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