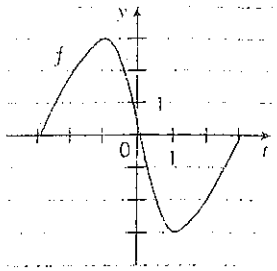
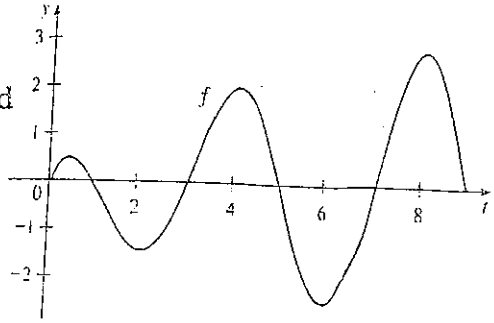
1. Let $g(x) = \int_3^x f(t)dt$, where f is the function whose graph is shown.



   a. Evaluate $g(-3)$ and $g(3)$.
   b. Estimate $g(-2)$, $g(-1)$, and $g(0)$.
   c. On what interval is g increasing. Justify your answer.
   d. Where does g have a maximum value? Justify your answer.

2. If $F(x) = \int_1^x f(t)dt$, where $f(t) = \int_1^{t^2} \frac{\sqrt{1+u^4}}{u} du$, find $F''(2)$.

3. Find the interval on which the curve $y = \int_0^x \frac{1}{1+t+t^2} dt$ is concave upward

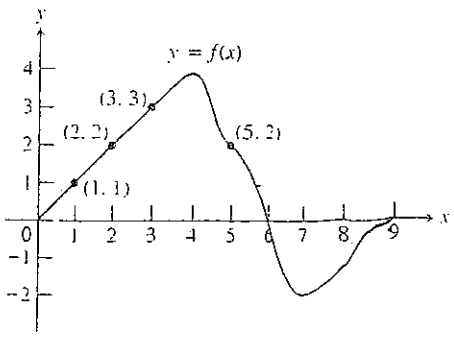


4. Let $g(x) = \int_0^x f(t)dt$, where f is the function whose graph is shown.

   a. At what values of x do the local maximum and minimum values of g occur? Justify your answer.
   b. Where does g obtain its absolute maximum value? Justify your answer.
   c. On what interval is g concave downward? Justify your answer.
   d. Sketch the graph of g.

5. f is the differentiable function whose graph is shown in the figure. The position at time t (sec) of a particle moving along a coordinate axis is $s = \int_0^t f(x)dx$ meters. Use the graph to answer the questions. **Give reasons for your answers.**

   a. What is the particle's velocity at time $t = 5$?
   b. Is the acceleration of the particle at time $t = 5$ positive or negative?
   c. What is the particle's position at time $t = 3$?
   d. At what time during the first 9 sec does s have its largest value?
   e. Approximately when is the acceleration zero?
   f. When is the particle moving toward the origin? away from the origin?
   g. On which side of the origin does the particle lie at time $t = 9$?



AP Calculus AB
Section 4.4 (Part 5) *First & Second Fundamental Theorems of Calculus*

Name _____
_____ Period
Date _____

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1. If $F(x) = \int_{1}^{x} (\cos 6t + 1)\, dt$, then $F'(x) =$

2. Suppose $F(x) = \int_{0}^{x^2} \frac{1}{2 + t^3}\, dt$ for all real x, then $F'(-1) =$

3. Consider the function F defined so that $F(x) + 5 = \int_{2}^{x} \sin\left(\frac{\pi t}{4}\right) dt$.

The value of $F(2) + F'(2)$ is

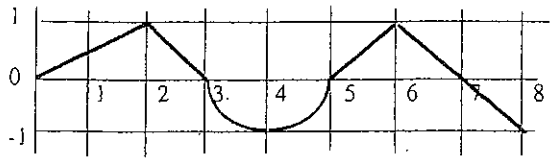
4. If the function G is defined for all real numbers by $G(x) = \int_{0}^{2x} \cos(t^2)\, dt$, then $G'(\sqrt{\pi}) =$

5. The approximate *average* rate of change of the function $f(x) = \int_0^x \sin(t^2)\, dt$ over the interval [1, 3] is

6. Suppose $F(x) = \int_0^{\cos x} \sqrt{1+t^3}\, dt$ for all real x, then $F'\left(\frac{\pi}{2}\right) =$

Given: $5x^3 + 40 = \int_a^x f(t)\, dt$. The value of a is

8. Let the function F be defined on the interval [0, 8] by $F(x) = \int_0^x f(t)\, dt$, where the graph of f is shown below.



graph of $y=f(t)$

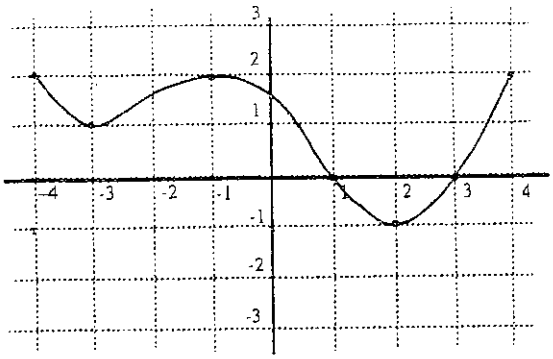
In which of the following intervals does F have a zero?

I. $4 < x < 5$ II. $5 < x < 6$ III. $6 < x < 7$

(A) I only (B) II only (C) III only (D) I and II only (E) I and III only

4. The graph of a differentiable function f on the closed interval $-4, 4]$ is shown at the right.

graph of f



Let $G(x) = \int_{-4}^{x} f(t)\,dt$ for $-4 \le x \le 4$.

(a) Find $G(-4)$.

(b) Find $G'(-1)$.

(c) On which interval or intervals is the graph of G concave down. Justify your answer.

(d) Find the value of x at which G has its maximum on the closed interval $[-4, 4]$. Justify your answer.