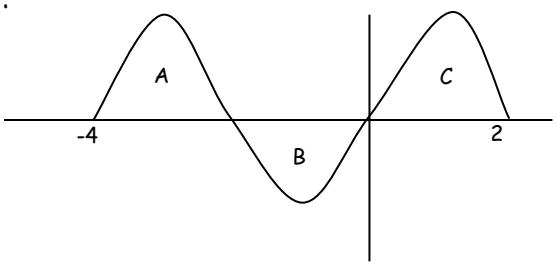
AP Calculus AB Name _____
Chapter 4
AP Practice

1. The regions A, B, and C in the figure at right are bounded by the graph of the function f and the x-axis. If the area of each region is 3, what is the value of:

$$\int_{-4}^{2}(f(x)+1)dx$$

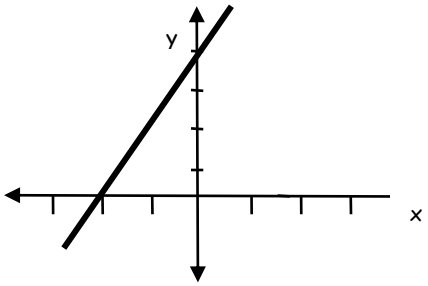


   a. 3
   b. 4
   c. 7
   d. 9
   e. 10

2. Evaluate $\frac{d}{dx}\int_{3}^{x^3} e^{2t}dt$

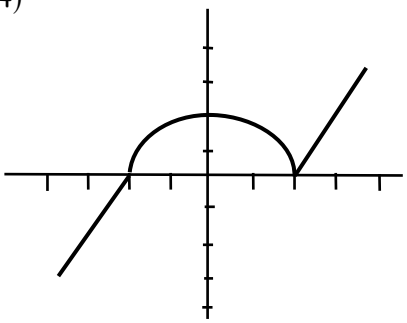
   a. e^{2x^3}
   b. e^{x^3}
   c. $\frac{1}{2}e^{2x^3}-\frac{1}{2}e^{3}$
   d. $e^{2x^3}\cdot 3x^2$
   e. $e^{x^3}\cdot 3x^2$

3. The graph of f', the derivative of f is the line shown in the figure below. If $f(0)=-2$, then $f(-2)=?$



   a. -10
   b. -6
   c. 0
   d. 4
   e. 6

4. The graph of a piecewise function f, $-4\le t\le 4$, consists of two line segments and a semicircle as shown at right. If function $g(x)=\int_{2}^{x} f(t)dt$, find $g(-4)$



   a. $3-\pi$
   b. $3-2\pi$
   c. $1-2\pi$
   d. $2\pi-3$
   e. $\pi-3$

5. A factory is currently producing $10\sqrt[3]{2t+1}$ machines per hour. If a day starts at t=0, how many machines are produced in and 8-hour day

   a. 10 b. 16 c. 26 d. 121 e. 160

6. The function f is continuous on the closed interval $[-2, 10]$ and has values given in the table below.

x	-2	0	3	4	7	9	10
$f(x)$	3	6	-1	2	8	4	-3

   Using the subintervals $[-2, 3]$, $[3, 7]$, and $[7,10]$ find the midpoint Riemann sum for $\int_{-2}^{10} f(x)dx$.

   a. 18 b. 35 c. 50 d. 55 e. 95

7. What is the value of $\int_{-1}^{5} f'(2t)dt$?

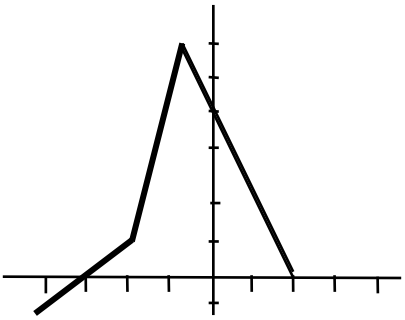
   a. $2f(10)-2f(-2)$ b. $\frac{1}{2}f(5)-\frac{1}{2}f(-1)$
   c. $\frac{1}{2}f(10)-\frac{1}{2}f(-2)$ d. $f(10)-f(-2)$
   e. $2f(5)-2f(-1)$

AP Calculus AB Name _____
Chapter 4
Free Response

Directions: do these problems on a separate sheet of paper. Please work neatly and follow directions

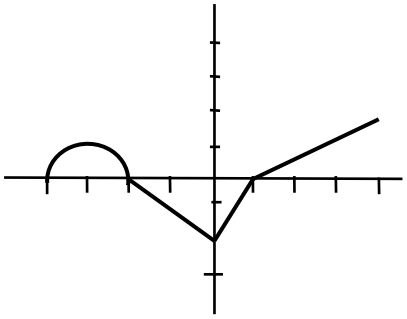
1. For $-4 \le t \le 2$ the graph of a function f is shown below. Let $g(x) = \int_0^{\frac{1}{2}x} f(t)dt$

The graph of $f(t)$



a. What is the domain of $g(x)$?
b. Compute, or state that it does not exist, $g(-2)$, $g'(-2)$, $g''(-2)$.
c. Find all the values of x where $g(x)$ has a relative minimum. Justify your answer.
d. Find all values of x in the open interval $(-8, 4)$ for which the graph of g has a point of inflection

2. The graph of $y = f(x)$, shown below, consists of three line segments and a semicircle.

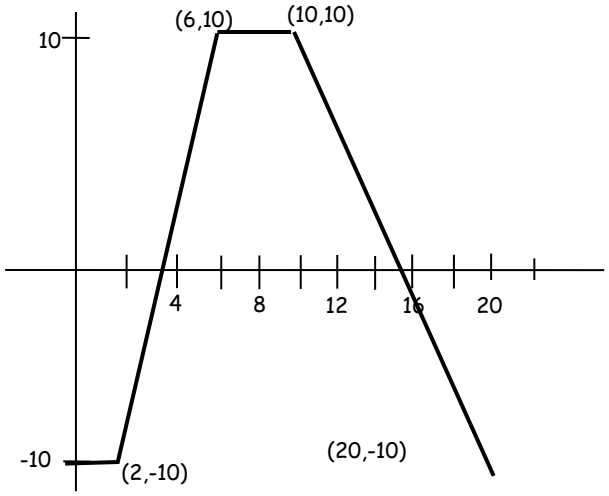


a. Find the average rate of change for the function f over the interval $[-4, 4]$.
b. Find the average value for the function f over the interval $[-4, 4]$

Let function $g(x) = \int_{-2}^{x} f(t)dt$ for all x in the closed interval $[-4, 4]$.

c. Which is larger $g(-4)$ or $g(-2)$? Explain why.
d. Write an equation for the line tangent to the graph of $y = g(x)$ at $x = 1$

3. A car is traveling on a straight road with velocity 50ft/sec at $t = 0$. For $0 \le t \le 20$, the car's acceleration $a(t)$, in ft/sec^2, is the piecewise linear function defined by the graph below.



a. Is the velocity of the car increasing at $t = 2$ seconds? Why or why not?
b. Is the speed of the car increasing or decreasing at time $t = 2$? Give a reason for your answer.
c. At what time in the interval $0 \le t \le 20$ is the velocity of the car 50 ft/sec?
d. On the time interval $0 \le t \le 20$, what is the car's absolute maximum velocity, in ft/sec: At what time does it occur? Why?