

AP Calculus BC '18-19
Integral Test

Name _____

Score _____

NO CALCULATOR ALLOWED

If $\int_1^4 h(x) dx = 6$, then $\int_1^4 h(5-x) dx =$

- a) -6 b) -1 c) 0 d) 3 e) 6
-

2. $\int_0^4 |2x-1| dx$

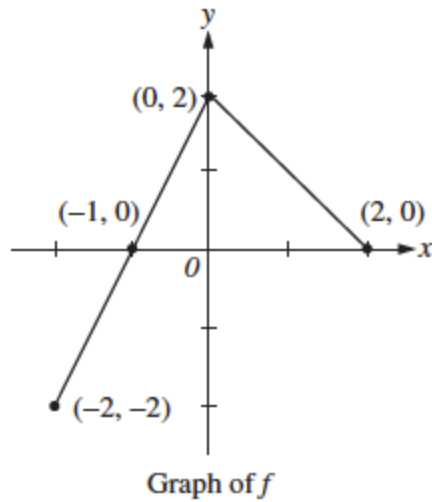
- a) 10 b) 11 c) 11.5 d) 12 e) 12.5
-

3. $\int_0^1 \frac{1}{\sqrt{2-t^2}} dt$

- a) $\frac{\pi}{2}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{12}$ e) $\frac{\pi}{8}$
-

4. Find the average rate of change of $y = x^2 + 5x + 14$ on $x \in [-1, 2]$

- a) 3 b) 6 c) 9 d) $\frac{65}{6}$ e) 18
-



5. The graph of the function f shown above consists of two line segments. If g is the function defined by $g(x) = \int_{-1}^x f(t) dt$, then $g(-2) =$

- a) -2 b) -1 c) 0 d) 1 e) 2
-

6. For $t \geq 0$ hours, H is a differentiable function of t that gives the temperature, in degrees Celsius, at an Arctic weather station. Which of the following is the best interpretation of $H'(24)$?

- a) The change in temperature during the first day.
 b) The change in temperature during the 24th hour.
 c) The average rate at which the temperature changed during the 24th hour.
 d) The rate at which the temperature is changing during the first day.
 e) The rate at which the temperature is changing at the end of the 24th hour.
-

7. The following table lists the known values of a function $f(x)$.

x	1	2	3	4	5
$f(x)$	0	1.1	1.4	1.2	1.5

If the Midpoint Riemann Sum is used to approximate $\int_1^5 f(x) dx$ the result is

- a) 3.7 b) 4.5 c) 4.6 d) 5.2
e) none of these
-

AP Calculus BC '18-19
Integral Test

Name _____

Score _____

CALCULATOR ALLOWED

Directions: Show all work.

Do not use math 9.

1. $\int_0^{\pi/9} \left(\tan 3x + \frac{x}{4+x^2} \right) dx$. Show the anti-derivatives.

2. Find the average value of $y = \frac{4}{x} \ln^3 x$ on $x \in [1, e]$. Show the anti-derivative.

3. Find the area between $y = xe^{3x^2}$ and the x -axis on $x \in [-2, 1]$. Show the anti-derivative.

4. Find the area on $x \in [0, 2]$ under $f(x) = \frac{1}{x^2+9} + \sin 4x$. Show the anti-derivative.

5. When a certain grocery store opens, it has 50 pounds of bananas on a display table. Customers remove bananas from the display table at a rate modeled by

$$f(t) = 10 + .8t \sin\left(\frac{t^3}{100}\right) \text{ for } 0 < t \leq 12,$$

where $f(t)$ is measured in pounds per hour and t is the number of hours after the store opened. After the store has been open for three hours, store employees add bananas to the display table at a rate modeled by

$$g(t) = 3 + 2.4 \ln(t^2 + 2t) \text{ for } 3 < t \leq 12,$$

where $g(t)$ is measured in pounds per hour and t is the number of hours after the store opened.

a) How many pounds of bananas are removed from the display table during the first 2 hours the store is open?

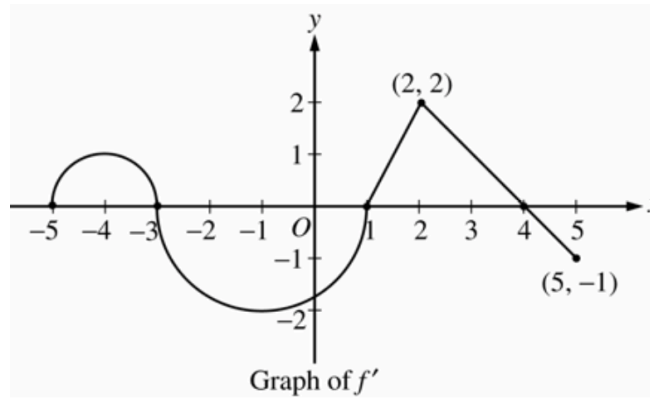
b) Find $f'(7)$. Using correct units, explain the meaning of $f'(7)$ in the context of the problem.

c) Is the number of pounds of bananas on the display table increasing or decreasing at time $t = 5$? Give a reason for your answer.

.

d) How many pounds of bananas are on the display table at time $t = 8$?

6. The graph of $f'(x)$, defined on $x \in [-5, 5]$, is shown below. $f'(x)$ consists of two semi-circles and two line segments.



Also, let $f(2) = 3$.

-
- a) For $-5 < x < 5$, find all values x at which f has a relative maximum. Justify your answer.

-
- b) Write the equation of the line tangent to $f(x)$ at $x = 2$.
-

c) On what interval(s), if any, is the graph of $f(x)$ both increasing and concave up? Justify your answer.

d) Find the absolute maximum value of $f(x)$ on $x \in [-5, 5]$. Justify your answer.
