UNIT 7 & 8 Basic Integration

REVIEW

NAME:__________________________

DATE:_______

Unit 7: Approximation Methods

Riemann Sums = Estimation of area under the curve. You need to be able to do left, right, and midpoint using rectangles, usually involves a table.

Trapezoidal Approximation = same as Riemann's but use trapezoids

MULTIPLE CHOICE

1. The graph shows which of the following?

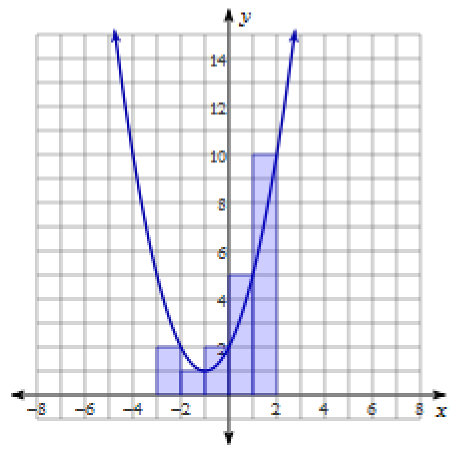
(A) Left hand Riemann Sum with 5 subintervals

(B) Right hand Riemann Sum with 5 subintervals

(C) Midpoint Riemann Sum with 5 subintervals

(D) Trapezoidal Approximation with 5 subintervals

(E) None of the above



FREE RESPONSE

2. Use a left-hand Riemann sum with 4 subintervals to approximate the integral based of the values in the table.

$$\int_0^{10} f(x)dx$$

x	0	4	6	7	10
$f(x)$	3	2	4	5	7

Unit 8: Integration

Integrals are the area under the curve

Indefinite Integrals = are evaluated using antidifferentiation, don't forget C, you can find C if they give you a point on the original curve. $\int f(x)dx$

Definite Integrals = are evaluated using the Fundamental Theorem of Calculus, geometry, or the calculator.

$$\int_a^b f(x)dx$$

When looking for a total area, use absolute values!

Review the properties of definite integrals.

Evaluate the indefinite integrals.

3. $\int \left(\frac{x^3}{4} + \sqrt{x}\right) dx$

4. $\int 3x^{-1} dx$

5. $\int (e^x - \sin x) dx$

Evaluate the definite integrals using Fundamental Theorm of Calculus.

6.
$$\int_{-4}^{-2} \left(-\frac{x^2}{2} - 3x - \frac{7}{2}\right) dx$$

7.
$$\int_{1}^{3} \left(\frac{x^3 - x}{3x}\right) dx$$

Answer the following.

8. Given that $f'(x) = \frac{1}{2}x^2 + \frac{3}{4}x$ and $f(1) = 2$. Find $f(x)$.

9. A particle moves along a coordinate line. Its accelartion function is $a(t) = 6t - 22$ for $t \geq 0$. If $v(0) = 24$ find the velocity at $t = 4$.

TEST PREP

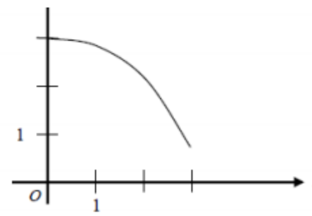
NO CALCULATOR

1. $\int \frac{1}{x^2} dx =$

(A) $\ln x^2 + C$
(B) $-\ln x^2 + C$
(C) $x^{-1} + C$
(D) $-x^{-1} + C$
(E) $-2x^{-3} + C$

2. The graph of function f is shown below for $0 \leq x \leq 3$. Of the following, which has the least value?

(A) $\int_1^3 f(x)dx$
(B) Left Riemann sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length
(C) Right Riemann sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length
(D) Midpoint Riemann sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length
(E) Trapezoidal sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length



Graph of f

3. $$\int_0^{\frac{\pi}{4}} \sin x \, dx$$

(A) $-\frac{\sqrt{2}}{2}$
(B) $\frac{\sqrt{2}}{2}$
(C) $-\frac{\sqrt{2}}{2} - 1$
(D) $-\frac{\sqrt{2}}{2} + 1$
(E) $\frac{\sqrt{2}}{2} + 1$

CALCULATOR ACTIVE

4. If $\int_{-5}^{2} f(x)dx = -17$ and $\int_{5}^{2} f(x)dx = 4$, what is the value of $\int_{-5}^{5} f(x)dx$?

(A) -21
(B) -13
(C) 0
(D) 13
(E) 21

CALCULATOR ACTIVE

5. The rate of change of the altitude of a hot-air balloon is given by $r(t) = t^3 - 4t^2 + 6$ for $0 \le t \le 8$. Which of the following expressions gives the change in altitude of the balloon during the time the altitude is decreasing?

(A) $\int_{1.572}^{3.514} r(t)dt$

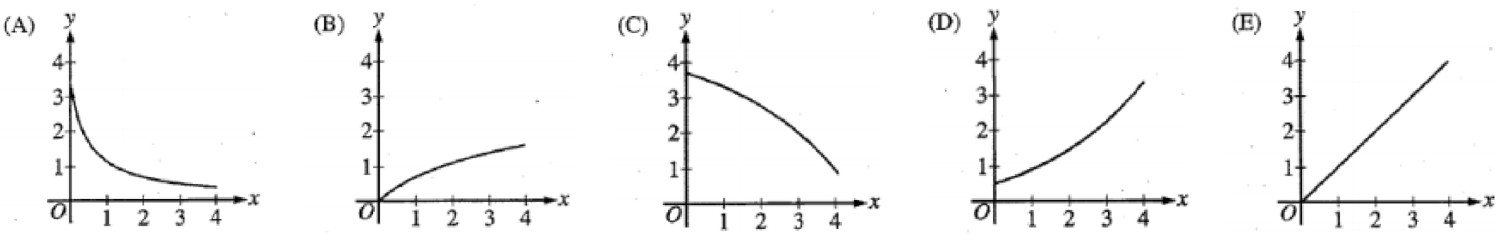
(B) $\int_{0}^{8} r(t)dt$ 0

(C) $\int_{0}^{2.667} r(t)dt$

(D) $\int_{1.572}^{3.514} r'(t)dt$

(E) $\int_{0}^{2.667} r'(t)dt$

6. If a trapezoidal sum overapproximates $\int_0^4 f(x)dx$, and a right Riemann sum underapproximates $\int_0^4 f(x)dx$, which of the following could be the graph of $y = f(x)$?



FREE RESPONSE
CALCULATOR ACTIVE

t (minutes)	0	2	5	9	10
$H(t)$ (degrees Celsisus)	66	60	52	44	43

7. As a pot of tea cools, the temperature of the tea is modeled by a differentiable function H for $0 \le t \le 10$, where time t is measure in minutes and temperature $H(t)$ is measured in degrees Celsius. Values of $H(t)$ at selected values of time t are shown in the table above.

(a) Use a trapezoidal sum with four subintervals indicated by the table to estimate $\int_0^{10} H(t)dt$.

(b) Using correct units, explain the meaning of $H'(7)$. Use the table to approximate $H'(7)$. Show your calculations.