AP Calculus — Ch 6 REVIEW ASSIGNMENT

TEXTBOOK: P 319 #1-10, 12ab, 13, 15, 17, 19, 20-25, 27, 30, 31, 33, 36-39, 41, 42, 45-47, 49-51, 54, 55

- **Know all of your antiderivative formulas for the CH 6 FORMULA TEST**

Riemann Sums – You might be given a function's equation, data in graphs, or data in charts.

1. If $f(x) = -x^2 + 2$, estimate the value of $\int_0^2 f(x)\,dx$ using 4 subintervals of equal length and the approximation method indicated. (Use a calculator and as always, include 3 decimal places if necessary.)

   (a) A left Riemann sum

   (b) A right Riemann sum

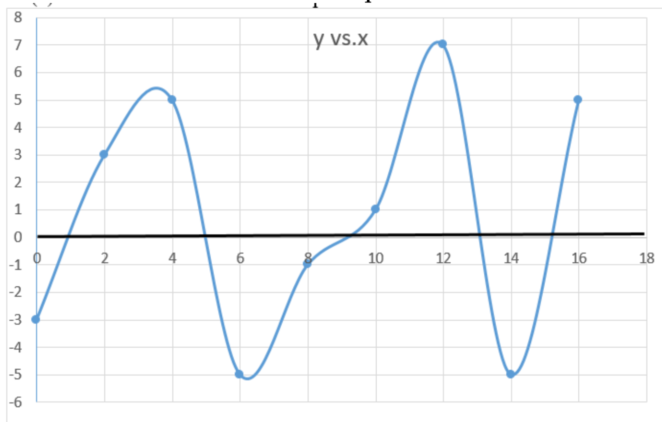
   (c) A midpoint approximation

   (d) A trapezoidal approximation

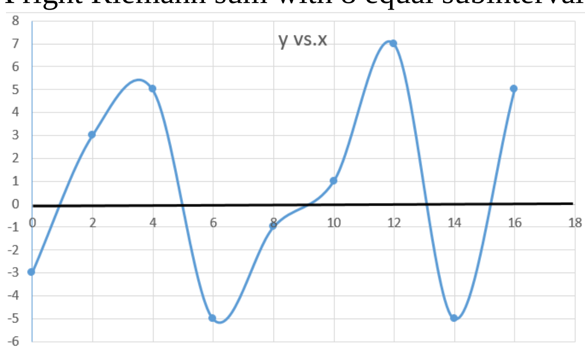
2. Use your calculator to evaluate the integral from question 1. Then for each approximation draw a sketch of the strips used and justify why the value is an overestimate or underestimate.

3. For each graph of the function $y = f(x)$, draw in the area strips and estimate $\int_0^{16} f(x)dx$.

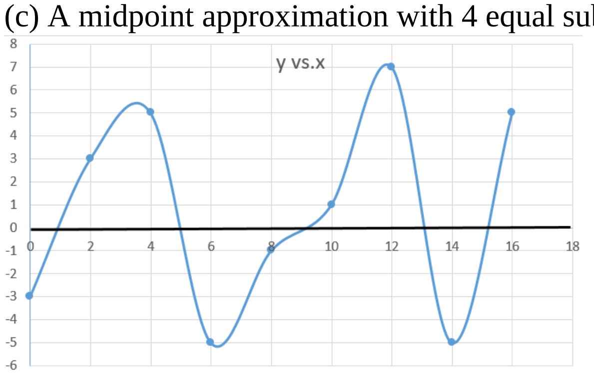
(a) A left Riemann sum with 8 equal subintervals.



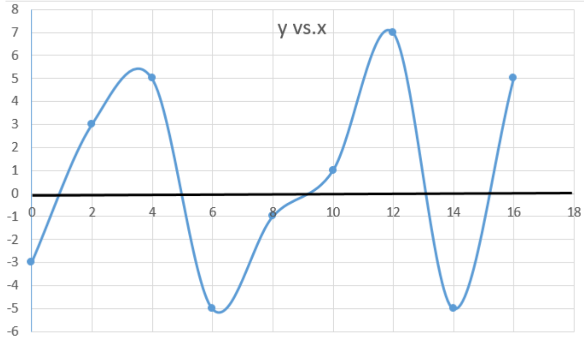
(b) A right Riemann sum with 8 equal subintervals.



(c) A midpoint approximation with 4 equal subintervals.



(d) A trapezoidal approximation with 4 equal subintervals.



x	0	0.8	2	3.6	4
$f(x)$	9.58	3.5	-0.82	2.38	4.78

4. Selected values for the function f are given above. Approximate the value of $\int_0^4 f(x)dx$ using:

(a) A left Riemann sum using 4 subintervals.

(b) A right Riemann sum using 4 subintervals.

x	0	0.4	0.8	1.2	1.6	2	2.4
$f(x)$	1	1.16	1.64	2.44	3.56	5	6.76

5. Selected values for the function f are given above. Approximate the value of $\int_0^{2.4} f(x)dx$ using:

(a) A midpoint approximation using 3 subintervals.

(b) A trapezoidal approximation using 3 equal subintervals.

Be able to describe what you are finding.

6. The function $v(t)$ gives a particle's velocity at a time t in meters per second.

(a) Using correct units, explain what the integral $\int_1^3 v(t)dt$ would find.

(b) Using correct units, explain what $v'(4)$ would find.

Integrals can be expressed using summation notation.

7. Write an integral that the following Riemann sum estimates:

$$\left[3\left(\frac{1}{40}\right)^3 + 3\left(\frac{2}{40}\right)^3 + 3\left(\frac{3}{40}\right)^3 + \ldots\ldots + 3\left(\frac{40}{40}\right)^3\right]\frac{1}{40}$$

8. Write an integral that is equal to the limit given below: (Can you write a second one?)

$$\lim_{n\to\infty}\sum_{k=1}^{n} 4\left(1+\frac{2k}{n}\right)^2 \frac{2}{n}$$

9. Write the following definite integrals as limits.

(a) $\int_1^2 x^2 dx$

(b) $\int_1^2 4x^2 dx$

(c) $\int_0^1 (1+x)^2 dx$

(d) $\int_0^1 4(1+x)^2 dx$

Know how to manipulate integrals to solve problems:

7. Evaluate $\int_1^5 f(x)dx$ if $\int_1^7 2f(x)dx = 8$ and $\int_5^7 f(x)dx = 3$.

Know how to apply the Fundamental Theorem of Calculus, parts I and II.

8. Find $\frac{dy}{dx}$ when $y = \int_0^{x^2} \tan 5t \, dt$

9. If the antiderivative of $f(x)$ is $\sin(x^2 - 3)$, evaluate $\int_1^2 f(x)dx$

10. If $g(x) = \int_1^x f(x)dx$, where the function f is continuous and $f(3) = 5$, $f(1) = 2$, and $f(0) = 9$. Evaluate $g'(3)$.