AP Calculus AB **Name**____

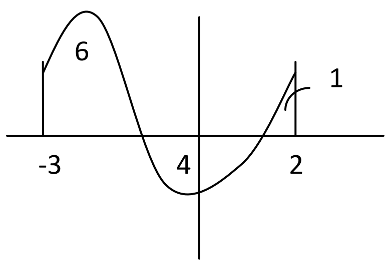
Chapter 5 Test Review **Date**__________________________**Hour**________________

Find the total area of the region bound by the x-axis and a function f(x) on the given interval:

1. $f(x) = 2x - 4,\ [0, 3]$

2. $f(x) = -x^2 + 4\ [-2,2]$

3. Evaluate $\int_{-3}^{2} \mathbf{f(x)dx}$ if the three regions on the graph have the given areas. (Remember integral=net area)



Given the following integrals, use the rules of integration to find each value.

$$\int_{-5}^{1} f(x)dx = 3 \qquad \int_{4}^{1} f(x)dx = -6 \qquad \int_{1}^{4} g(x)dx = 2$$

4. $\int_0^0 g(x)\,dx$

5. $\int_1^4 3f(x)\,dx$

6. $\int_1^4 \big(f(x) - 2g(x)\big)dx$

7. $\int_{-5}^{4} f(x)\,dx$

8. A function f is continuous on the closed interval [1, 12] and has values given in the table below. Use four subintervals to find the trapezoidal approximation of $\int_1^{12} \mathbf{f(x)dx}$

x	1	2	5	9	12
f(x)	7	1	0	-8	5

9. Use the table above to compute the left rectangular approximation of the integral using four rectangles.

Use the Fundamental Theorem of Calculus to find the following:

10. $\frac{d}{dx}\int_3^x \sin(2t)\,dt$

11. $\frac{d}{dx}\int_0^{3x^2}\left(\frac{1-t}{t}\right)dt$

12. $\frac{d}{dx}\int_{-5}^{2x}\tan u\,du$

13. If $F(x) = \int_0^x (9\sqrt{t}+2)dt,$ find $F'(1)$

14. If $F(x) = \int_{-2}^x 2\sec u\,du,$ find $F'(\pi)$

Solve the definite integral WITHOUT the use of a calculator:

15. $\int_1^4 (2x+7)\,dx$

16. $\int_1^9 \frac{3}{\sqrt{x}}dx$

17. $\int_0^{\pi/4}\sin x\,dx$

18. Find all values for k that satisfy the following integral:

$$\int_2^k 4udu = 10$$

19. Construct a function G(x) that satisfies the following conditions:

G(x) is an antiderivative of f(x) → G'(x) = f(x)
G(1) = 3.
**Hint- use the following format: $G(x) = \int_a^x f(t)dt + C$

If G(x) is an antiderivative for f(x) and G(1) = 4, then G(5) = ?

<u>Review Topics</u>

Continuity/Differentiability
Rules for derivatives INCLUDING chain rule, product rule, quotient rule, and ALL SPECIAL FORMULAS!

Free Response Style Questions

Let *f* be a function that is twice differentiable for all real numbers. The table gives values of *f* for selected points in the closed interval $3 \le x \le 11$.

x	3	5	6	9	11
f(x)	2	1	-3	2	9

a. Estimate f'(4). Show all work. ***Remember, derivative = slope*

b. Evaluate $\int_3^{11}(3f'(x)-1)dx$

c. Use a right Riemann sum with 4 subintervals indicated by the table above to approximate the integral, $\int_2^{13} f(x)dx$

d. Use a trapezoidal approximation with 4 subintervals to approximate the integral, $\int_2^{13} f(x)dx$

2. Let *f* be the function defined by $f(x) = ke^x + \ln x$ for *x > 0*, where *k* is a positive constant.
   a. Find *f'(x)* and *f''(x)*

   b. For what value of the constant *k does f* have a critical point at x = 1? For this value of *k,* determine whether *f* has a relative minimum, maximum, or neither at x = 1. Justify your answer.

   c. If f has a point of inflection, write an equation for k in terms of x.

3. Repeat #2 with $g(x) = kx^3 + \ln x$