AP Calculus BC
Section 5.2 – Definite Integrals

Evaluate each definite integral using geometry.

1. $\int_0^3 4dx$

2. $\int_0^4 (3-x)dx$

3. $\int_0^2 (2x+5)dx$

4. $\int_{-1}^1 (2-|x|)dx$

5. $\int_{-3}^3 \sqrt{9-x^2}dx$

6. $\int_{-1}^1 \left(1+\sqrt{1-x^2}\right)dx$

Find each of the following given *f* and *g* are continuous functions such that $\int_1^2 f(x)dx = -4$, $\int_1^5 f(x)dx = 6$, and $\int_1^5 g(x)dx = 8$.

7. $\int_2^2 g(x)dx$

8. $\int_5^1 g(x)dx$

9. $\int_1^2 3f(x)dx$

10. $\int_2^5 f(x)dx$

11. $\int_1^5 [f(x)-g(x)]dx$

12. $\int_1^5 3g(x)+f(x)-5dx$

Find each of the following given *f* and *g* are continuous functions such that $\int_2^4 x^3 dx = 60$, $\int_2^4 xdx = 6$, and $\int_2^4 dx = 2$.

11. $\int_4^2 4xdx$

14. $\int_2^4 15dx$
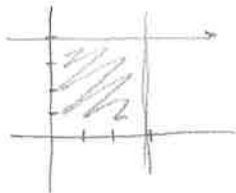
15. $\int_2^4 (x-8)dx$

16. $\int_2^4 (x^3+4)dx$

17. $\int_2^4 \left(\frac{1}{2}x^3 - 3x + 2\right)dx$

18. $\int_4^2 (6+2x-x^3)dx$

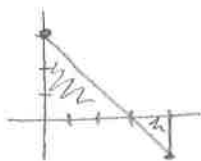# AP Calculus BC
Section 5.2 – Definite Integrals

Evaluate each definite integral using geometry.
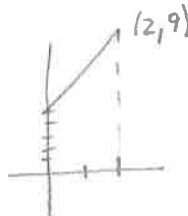
1. $\int_0^3 4\,dx$

$\boxed{12}$
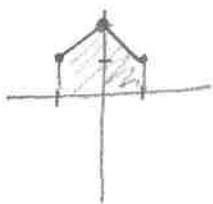
2. $\int_0^4 (3-x)\,dx$

$\frac{1}{2}(3)(3) - \frac{1}{2}(1)(1)$

$\boxed{4}$

3. $\int_0^2 (2x+5)\,dx$

$(2,9)$
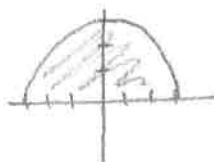
$\frac{1}{2}(2)(5+9)$

$\boxed{14}$

4. $\int_{-1}^1 (2-|x|)\,dx$

$2\left[\frac{1}{2}(1)(1+2)\right]$

$\boxed{3}$

5. $\int_{-3}^3 \sqrt{9-x^2}\,dx$

$\frac{1}{2}\pi(3)^2$

$\boxed{\dfrac{9\pi}{2}}$

6. $\int_{-1}^1 \left(1+\sqrt{1-x^2}\right)\,dx$

$2(1) + \frac{1}{2}\pi(1)^2$

$2 + \frac{\pi}{2}$

$\boxed{\dfrac{4+\pi}{2}}$

Find each of the following given f and g are continuous functions such that $\int_1^2 f(x)dx = -4$, $\int_1^5 f(x)dx = 6$, and $\int_1^5 g(x)dx = 8$.

7. $\int_2^2 g(x)dx$

$\boxed{0}$

8. $\int_5^1 g(x)dx$

$= -\int_1^5 g(x)dx$

$= \boxed{-8}$

9. $\int_1^2 3f(x)dx$

$3\int_1^2 f(x)dx$
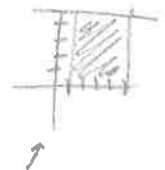
$3(-4) = \boxed{-12}$

10. $\int_2^5 f(x)dx$

$\int_2^5 f(x)dx = \int_1^5 f(x)dx - \int_1^2 f(x)dx$

$= 6 - (-4)$

$= \boxed{10}$

11. $\int_1^5 [f(x) - g(x)]dx$

$6 - 8$

$\boxed{-2}$

12. $\int_1^5 3g(x) + f(x) - 5dx$

$3\int_1^5 g(x)dx + \int_1^5 f(x)dx - \int_1^5 5dx$

$3(8) + 6 - 5(4)$

$\boxed{4}$

Find each of the following given f and g are continuous functions such that $\int_2^4 x^3 dx = 60$, $\int_2^4 xdx = 6$, and $\int_2^4 dx = 2$.

11. $\int_4^2 4xdx$

$-4\int_2^4 xdx$

$-4(6) = \boxed{-24}$

14. $\int_2^4 15dx$

$15(2)$

$\boxed{30}$

15. $\int_2^4 (x-8)dx$

$\int_2^4 xdx - 8\int_2^4 dx$

$6 - 8(2)$

$\boxed{-10}$

16. $\int_2^4 (x^3 + 4)dx$

$\int_2^4 x^3 dx + 4\int_2^4 dx$

$60 + 4(2)$

$\boxed{68}$

17. $\int_2^4 \left(\frac{1}{2}x^3 - 3x + 2\right)dx$

$\frac{1}{2}\int_2^4 x^3 dx - 3\int_2^4 xdx + 2\int_2^4 dx$

$\frac{1}{2}(60) - 3(6) + 2(2)$

$30 - 18 + 4$

$\boxed{16}$

18. $\int_4^2 (6 + 2x - x^3)dx = -\int_2^4 6 + 2x - x^3 dx$

$-6\int_2^4 dx - 2\int_2^4 xdx + \int_2^4 x^3 dx$

$-6(2) - 2(6) + 60$

$\boxed{36}$