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Course: Calc 1 11:30 AM / Internet
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Assignment: 5.3 The Definite Integral
(Set 1)

1. Express the limit $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n c_k^6 \Delta x_k$, P a partition of [4,6], as a definite integral.

The $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n c_k^6 \Delta x_k$, with P a partition of [4,6], expressed as a definite integral, is

$$\int_4^6 x^6 \, dx$$

2. Express the limit $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (c_k^9 - 4c_k) \Delta x_k$, P a partition of [-2,11], as a definite integral.

The limit expressed as a definite integral is

$$\int_{-2}^{11} (x^9 - 4x) \, dx$$

3. Express the limit $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (\cot c_k) \Delta x_k$ as a definite integral where P is a partition of $\left[\frac{\pi}{3}, \frac{2\pi}{3}\right]$.

$$\frac{2\pi}{3}$$

The limit expressed as a definite integral, is

$$\int_{\frac{\pi}{3}}^{\frac{2\pi}{3}} (\cot x) \, dx$$

(Type an exact answer, using π as needed.)

4.

The functions f and g are integrable and $\int_2^4 f(x)dx = -6$, $\int_2^7 f(x)dx = 6$, and $\int_2^7 g(x)dx = 4$. Use these to complete parts (a) through (f).

a. $\int_4^4 f(x)dx = \boxed{0}$

(Simplify your answer.)

b. $\int_7^2 g(x)dx = \boxed{-4}$

(Simplify your answer.)

c. $\int_2^7 2g(x)dx = \boxed{8}$

(Simplify your answer.)

d. $\int_4^7 f(x)dx = \boxed{12}$

(Simplify your answer.)

e. $\int_2^7 [g(x) - f(x)]dx = \boxed{-2}$

(Simplify your answer.)

f. $\int_2^7 [8g(x) - f(x)]dx = \boxed{26}$

(Simplify your answer.)

5.

Suppose that $\int_2^3 f(x)dx = 8$. Find the value of the following definite integrals. Complete parts **(a)** through **(d)**.

(a) $\int_2^3 f(u)du = \underline{\hspace{2cm}} 8 \underline{\hspace{2cm}}$ (Type an exact answer, using radicals as needed.)

(b) $\int_2^3 \sqrt{2} f(z)dz = \underline{\hspace{2cm}} 8\sqrt{2} \underline{\hspace{2cm}}$ (Type an exact answer, using radicals as needed.)

(c) $\int_3^2 f(t)dt = \underline{\hspace{2cm}} -8 \underline{\hspace{2cm}}$ (Type an exact answer, using radicals as needed.)

(d) $\int_2^3 [-f(x)]dx = \underline{\hspace{2cm}} -8 \underline{\hspace{2cm}}$ (Type an exact answer, using radicals as needed.)

6.

Suppose that f is integrable, and that $\int_0^4 f(z)dz = 5$ and $\int_0^5 f(z)dz = 9$. Find the value of the following definite integrals.

(a) $\int_4^5 f(z)dz = \underline{\hspace{2cm}} 4 \underline{\hspace{2cm}}$ (Type an integer or a decimal.)

(b) $\int_5^4 f(z)dz = \underline{\hspace{2cm}} -4 \underline{\hspace{2cm}}$ (Type an integer or a decimal.)

7.

Graph the integrand, and use area to evaluate the definite integral $\int_{-2}^4 \left(\frac{x}{2} + 4\right)dx$.

The value of the definite integral $\int_{-2}^4 \left(\frac{x}{2} + 4\right)dx$ as determined by the area under the graph of the integrand is

27.

(Simplify your answer.)

8.

Use area to evaluate the integral $\int_0^b \frac{10x}{11} dx$, $b > 0$.

$\int_0^b \frac{10x}{11} dx = \underline{\hspace{2cm}} \frac{10b^2}{22} \underline{\hspace{2cm}}$

9. Use areas to evaluate the integral.

$$\int_a^{12b} 2s \, ds, \quad 0 < a < b$$

$$\int_a^{12b} 2s \, ds = \boxed{144b^2 - a^2}$$

10. $\int_3^{\sqrt{10}} x \, dx$

Evaluate the integral $\int_3^{\sqrt{10}} x \, dx$.

The value of the integral $\int_3^{\sqrt{10}} x \, dx$ is $\boxed{\frac{1}{2}}$.

(Type an integer or a simplified fraction.)

11. $\int_{5\pi}^{6\pi} \theta \, d\theta$

Evaluate the integral $\int_{5\pi}^{6\pi} \theta \, d\theta$.

$$\int_{5\pi}^{6\pi} \theta \, d\theta = \boxed{\frac{11\pi^2}{2}}$$

(Type an exact answer, using π as needed.)