

Name _____

Find the value of the indicated sum.

1) $\sum_{k=1}^4 2 \cos \frac{\pi}{k}$

1) _____

Objective: (5.1) Find Value of Sum

2) $\sum_{k=1}^3 (-1)^k \sin \frac{3\pi}{2}$

2) _____

Objective: (5.1) Find Value of Sum

Write the indicated sum in sigma notation.

3) $6 + \frac{6}{2} + \frac{6}{3} + \dots + \frac{6}{10}$

3) _____

Objective: (5.1) Write Sum in Sigma Notation

4) $-(1 - 5)^2 + (2 - 5)^2 - (3 - 5)^2$

4) _____

Objective: (5.1) Write Sum in Sigma Notation

Find the value of the specified finite sum.

5) Given $\sum_{k=1}^n a_k = -6$ and $\sum_{k=1}^n b_k = 5$, find $\sum_{k=1}^n (a_k + b_k)$.

5) _____

Objective: (5.1) Use Properties of Sigma Notation

6) Given $\sum_{k=1}^n a_k = 2$ and $\sum_{k=1}^n b_k = 7$, find $\sum_{k=1}^n (a_k - 2b_k)$.

6) _____

Objective: (5.1) Use Properties of Sigma Notation

Use Special Sum Formulas to find the sum.

$$7) \sum_{k=1}^{24} (8k^3 - 12k^2)$$

7) _____

Objective: (5.1) Use Special Sum Formulas to Find Sum

Find the area under the curve of the function on the stated interval. Do so by dividing the interval into n equal subintervals and finding the area of the corresponding circumscribed polygon.

$$8) f(x) = 2x^2 + x + 3 \text{ from } x = 0 \text{ to } x = 6; n = 6$$

8) _____

Objective: (5.1) Find Area Under Curve Using Finite Subintervals

Find the formula and limit as requested.

$$9) \text{ For the function } f(x) = 6x^2 + 1, \text{ find a formula for the upper sum obtained by dividing the interval } [0, 3] \text{ into } n \text{ equal subintervals. Then take the limit as } n \rightarrow \infty \text{ to calculate the area under the curve over } [0, 3].$$

9) _____

Objective: (5.1) Find Area Under Curve as n Approaches Infinity

Calculate the Riemann sum $\sum_{i=1}^n f(\bar{x}_i) \Delta x_i$ for the given data.

$$10) f(x) = x + 4; P: 2 < 2.75 < 3.25 < 4.5 < 5.5; \bar{x}_1 = 2, \bar{x}_2 = 3, \bar{x}_3 = 4.25, \bar{x}_4 = 5$$

10) _____

Objective: (5.2) Find Riemann Sum from Given Data

Use the given values of a and b and express the given limit as a definite integral.

$$11) \lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (3c \frac{2}{k} - 11c_k + 3) \Delta x_k, a = -5, b = 4$$

11) _____

Objective: (5.2) Express Limit of Riemann Sum as a Definite Integral

$$12) \lim_{\|P\| \rightarrow 0} \sum_{k=1}^n \sqrt{c \frac{2}{k} + 8} \Delta x_k, a = -7, b = 2$$

12) _____

Objective: (5.2) Express Limit of Riemann Sum as a Definite Integral

Evaluate the definite integral using the definition.

13) $\int_{-3}^5 3 \, dx$

13) _____

Objective: (5.2) Evaluate Definite Integral Using Definition

14) $\int_{-8}^4 (-2x + 8) \, dx$

14) _____

Objective: (5.2) Evaluate Definite Integral Using Definition

Solve the problem.

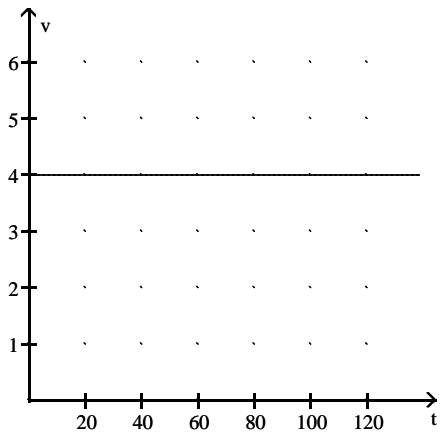
- 15) The velocity of an object is given by the velocity function $v(t) = t/42$. If the object is at the origin at time $t = 0$, find the position at time $t = 20$.

15) _____

Objective: (5.2) Find Position Given Velocity Function

- 16) An object's velocity function is graphed below. Determine the object's position at time $t = 40$ assuming the object is at the origin at time $t = 0$.

16) _____



Objective: (5.2) Find Position Given Graph of Velocity Function

- 17) Suppose that f and g are continuous and that $\int_7^{11} f(x) \, dx = -4$ and $\int_7^{11} g(x) \, dx = 9$.

17) _____

Find $\int_7^{11} [4f(x) + g(x)] \, dx$.

Objective: (5.3) Evaluate Definite Integral Using Properties

Find $G'(x)$.

$$18) G(x) = \int_0^{x^4} \sin t \, dt$$

18) _____

Objective: (5.3) Differentiate Integral

$$19) G(x) = \int_1^{\sqrt{x}} 18t^7 \, dt$$

19) _____

Objective: (5.3) Differentiate Integral

$$20) G(x) = \int_0^x \sqrt{4x+3} \, dt$$

20) _____

Objective: (5.3) Differentiate Integral

$$21) G(x) = \int_0^{x^4} \cos \sqrt{t} \, dt$$

21) _____

Objective: (5.3) Differentiate Integral

$$22) f(x) = \int_0^x \frac{1}{u^2} \, du$$

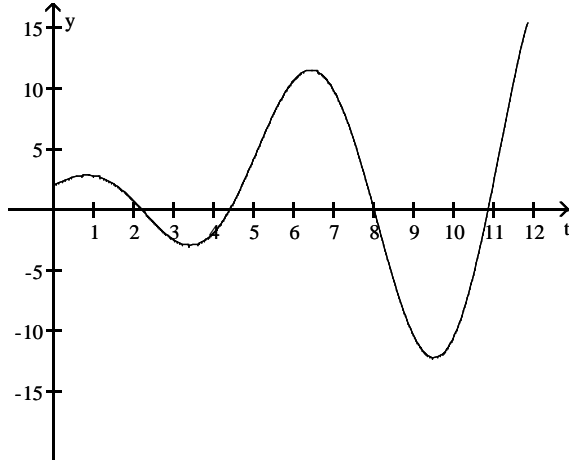
22) _____

Objective: (5.3) Find Intervals of Monotonicity/Concavity

Answer the question.

23) Consider the function $G(x) = \int_0^x f(t) dt$, where $f(t)$ oscillates about the line $y = 2$ over the x-region $[0, 12]$. 23) _____

The graph is given below:



At what values of x over this region do the local maxima of $G(x)$ occur?

Objective: (5.3) Analyze Graph of Function

Evaluate the integral.

24) $\int_0^{\frac{1}{8}} t^2 dt$ 24) _____

Objective: (5.4) Evaluate Definite Integral

25) $\int_0^4 2\sqrt{x} dx$ 25) _____

Objective: (5.4) Evaluate Definite Integral

26) $\int_{\pi/2}^{3\pi/2} 14 \cos x dx$ 26) _____

Objective: (5.4) Evaluate Definite Integral

27) $\int x^7(x^8 - 10)^4 dx$ 27) _____

Objective: (5.4) Find Integral Using Substitution

28) $\int 10x^2 \sqrt[4]{3 + 4x^3} dx$ 28) _____

Objective: (5.4) Find Integral Using Substitution

29) $\int x^2 \cos(x^3 + 6) \sqrt{\sin(x^3 + 6)} dx$ 29) _____

Objective: (5.4) Find Integral Using Substitution

Evaluate the definite integral.

30) $\int_0^2 (x + 2)^3 dx$ 30) _____

Objective: (5.4) Evaluate Definite Integral Using Substitution

31) $\int_0^6 \frac{5}{(6 + x)^2} dx$ 31) _____

Objective: (5.4) Evaluate Definite Integral Using Substitution

32) $\int_0^1 \frac{6x dx}{\sqrt{16 + 3x^2}}$ 32) _____

Objective: (5.4) Evaluate Definite Integral Using Substitution

33) $\int_{\pi/3}^{2\pi} 3 \cos^2 x \sin x dx$ 33) _____

Objective: (5.4) Evaluate Definite Integral Using Substitution

34) $\int_0^{\pi} (1 + \cos 7t)^2 \sin 7t dt$ 34) _____

Objective: (5.4) Evaluate Definite Integral Using Substitution

Solve the problem.

- 35) A certain company has found that its expenditure rate per day (in hundreds of dollars) on a certain type of job is given by $E'(x) = 6x + 9$, where x is the number of days since the start of the job. Find the expenditure if the job takes 8 days. 35) _____

Objective: (5.4) Solve Apps: Fundamental Theorem of Calculus

- 36) A certain object moves in such a way that its velocity (in m/s) after time t (in s) is given by $V(t) = t^2 + 2t + 8$. Find the distance traveled during the first four seconds. 36) _____

Objective: (5.4) Solve Apps: Fundamental Theorem of Calculus

Use symmetry to help evaluate the integral.

- 37) $\int_{-\pi/3}^{\pi/3} (\cos x + \sin x) dx$ 37) _____

Objective: (5.5) Evaluate Integral Using Symmetry

- 38) $\int_{-1}^1 (2 + 4x + 3x^2 + x^3) dx$ 38) _____

Objective: (5.5) Evaluate Integral Using Symmetry

Use the requested method to approximate the definite integral.

- 39) Use the method of left Riemann sum with $n = 4$ to approximate the value of $\int_3^7 x^2 dx$ 39) _____

Objective: (5.6) Use Riemann Sum to Approximate Integral

- 40) Use the method of right Riemann sum with $n = 4$ to approximate the value of $\int_1^5 x^2 dx$ 40) _____

Objective: (5.6) Use Riemann Sum to Approximate Integral

- 41) Use the method of midpoint Riemann sum with $n = 4$ to approximate the value of $\int_1^5 x^2 dx$ 41) _____

Objective: (5.6) Use Riemann Sum to Approximate Integral

Express the limit as a definite integral where P is a partition of the given interval.

$$42) \lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (3c_k^2 - 9c_k + 9) \Delta x_k, [-10, 4]$$

42) _____

Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

$$43) \lim_{\|P\| \rightarrow 0} \sum_{k=1}^n c_k^5 \Delta x_k, [-5, 4]$$

43) _____

Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

Answer Key

Testname: 13FALL_CH5_PROBS

- 1) $2 \cos \pi + 2 \cos \frac{\pi}{2} + 2 \cos \frac{\pi}{3} + 2 \cos \frac{\pi}{4} = -1 + \sqrt{2}$
- 2) $-\sin \frac{3\pi}{2} + \sin \frac{3\pi}{2} - \sin \frac{3\pi}{2} = 1$
- 3) $6 \sum_{i=1}^{10} \frac{1}{i}$
- 4) $\sum_{k=1}^3 (-1)^k (k-5)^2$
- 5) -1
- 6) -12
- 7) 661,200
- 8) 221
- 9) $3 + \frac{324n^3 + 486n^2 + 162n}{6n^3}$; Area = 57
- 10) 27.3125
- 11) $\int_{-5}^4 (3x^2 - 11x + 3) dx$
- 12) $\int_{-7}^2 \sqrt{x^2 + 8} dx$
- 13) 24
- 14) 144
- 15) $\frac{100}{21}$
- 16) 160
- 17) -7
- 18) $4x^3 \sin(x^4)$
- 19) $9x^3$
- 20) $\sqrt{4x+3}$
- 21) $4x^3 \cos(x^2)$
- 22) $f(x)$ is increasing on $(-\infty, 0)$ and $(0, \infty)$
 $f(x)$ is concave up on $(-\infty, 0)$
- 23) $\approx 2.1, \approx 8.0$
- 24) $\frac{1}{1536}$
- 25) $\frac{32}{3}$
- 26) -28
- 27) $\frac{(x^8 - 10)^5}{40} + C$
- 28) $\frac{2}{3}(3 + 4x^3)^{5/4} + C$
- 29) $\frac{2}{9}(\sin(x^3 + 6))^{3/2} + C$
- 30) 60
- 31) $\frac{5}{12}$
- 32) $2\sqrt{19} - 8$
- 33) $-\frac{7}{8}$
- 34) $\frac{8}{21}$
- 35) \$26,400
- 36) 69.3 m
- 37) $\sqrt{3}$
- 38) 6
- 39) 86
- 40) 54
- 41) 41
- 42) $\int_{-10}^4 (3x^2 - 9x + 9) dx$
- 43) $\int_{-5}^4 x^5 dx$