

Name \_\_\_\_\_

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

- 1)  $f(x) = x^2$  between  $x = 3$  and  $x = 7$  using a lower sum with four rectangles of equal width.  
A) 126                                      B) 105                                      C) 86                                      D) 117

Write the sum without sigma notation and evaluate it.

- 2)  $\sum_{k=1}^4 \frac{k^2}{8}$   
A)  $\frac{12}{8} \cdot \frac{22}{8} \cdot \frac{32}{8} \cdot \frac{42}{8} = \frac{567}{4096}$                                       B)  $\frac{12}{8} + \frac{22}{8} + \frac{32}{8} + \frac{42}{8} = \frac{15}{4}$   
C)  $\frac{12}{8} + \frac{42}{8} = \frac{17}{8}$                                       D)  $\frac{12}{8} + \frac{22}{8} + \frac{32}{8} + \frac{42}{8} = \frac{15}{32}$

- 3)  $\sum_{k=1}^3 (-1)^{k+1} \cos 6k\pi$   
A)  $\cos 6\pi + \cos 18\pi = 2$                                       B)  $-\cos 6\pi + \cos 12\pi - \cos 18\pi = -1$   
C)  $\cos 6\pi - \cos 12\pi + \cos 18\pi = -1$                                       D)  $\cos 6\pi - \cos 12\pi + \cos 18\pi = 1$

Find the formula and limit as requested.

- 4) For the function  $f(x) = 12 - 5x^2$ , find a formula for the lower sum obtained by dividing the interval  $[0, 1]$  into  $n$  equal subintervals. Then take the limit as  $n \rightarrow \infty$  to calculate the area under the curve over  $[0, 1]$ .  
A)  $\frac{10n^3 + 15n^2 + 5n}{6n^3}$ ; Area =  $\frac{5}{3}$                                       B)  $12 - \frac{10n^3 + 15n^2 + 5n}{6n^3}$ ; Area =  $\frac{31}{3}$   
C)  $12 - \frac{10n^3 + 15n^2 + 5n}{3n^3}$ ; Area =  $\frac{31}{3}$                                       D)  $12 + \frac{10n^3 + 15n^2 + 5}{6n^3}$ ; Area =  $\frac{41}{3}$

Solve the problem.

- 5) Suppose that  $\int_{-5}^{-2} g(t) dt = -11$ . Find  $\int_{-5}^{-2} \frac{g(x)}{-11} dx$  and  $\int_{-2}^{-5} -g(t) dt$ .  
A) 0; -11                                      B) 1; -11                                      C) 1; 11                                      D) -1; 11

Graph the integrand and use areas to evaluate the integral.

- 6)  $\int_{-7}^7 (|x| + 2) dx$   
A) 77                                      B) 63                                      C) 126                                      D) 105

Evaluate the integral.

$$7) \int_{-2}^4 4x^3 dx$$

A) 960

B) 12

C) -240

D) 240

$$8) \int_1^4 \left( t + \frac{1}{t} \right)^2 dx$$

A)  $\frac{111}{4}$

B)  $\frac{79}{4}$

C)  $\frac{349}{12}$

D)  $\frac{365}{12}$

$$9) \int_{\pi/4}^{3\pi/4} 8 \csc^2 x dx$$

A) -16

B) 8

C) 16

D) 0

Find the derivative.

$$10) \frac{d}{dt} \int_0^{\sin t} \frac{1}{16 - u^2} du$$

A)  $\frac{1}{16 - \sin^2 t}$

B)  $\frac{-\cos t}{16 - \sin^2 t}$

C)  $\frac{1}{\cos t (16 - \sin^2 t)}$

D)  $\frac{\cos t}{16 - \sin^2 t}$

$$11) y = \int_0^x \frac{dt}{5t + 6}$$

A)  $\frac{-5}{(5x + 6)^2}$

B)  $\frac{1}{5x + 6}$

C)  $\frac{-5}{(5x + 6)^2} + \frac{5}{36}$

D)  $\frac{1}{5x + 6} - \frac{1}{6}$

Evaluate the integral.

$$12) \int x^4 \sqrt{x^5 + 6} dx$$

A)  $-\frac{2}{5}(x^5 + 6)^{-1/2} + C$

B)  $\frac{2}{3}(x^5 + 6)^{3/2} + C$

C)  $\frac{10}{3}(x^5 + 6)^{3/2} + C$

D)  $\frac{2}{15}(x^5 + 6)^{3/2} + C$

$$13) \int \frac{\sin t}{(8 + \cos t)^5} dt$$

A)  $\frac{4}{(8 + \cos t)^4} + C$

B)  $\frac{1}{(8 + \cos t)^4} + C$

C)  $\frac{1}{4(8 + \cos t)^4} + C$

D)  $\frac{1}{6(8 + \cos t)^6} + C$

Find the integral.

$$14) \int \frac{x}{(6x+1)^{1/6}} dx$$

$$A) \frac{1}{6} \left[ \frac{(6x+1)^{11/6}}{5} - \frac{(6x+1)^{5/6}}{11} \right] + C$$

$$C) \frac{1}{6} \frac{(6x+1)^{11/6}}{11} - \frac{(6x+1)^{5/6}}{5} + C$$

$$B) \frac{1}{6} \left[ \frac{(6x+1)^{11/6}}{11} - \frac{(6x+1)^{5/6}}{5} \right] + C$$

$$D) \frac{(6x+1)^{11/6}}{11} - \frac{(6x+1)^{5/6}}{5} + C$$

Use the substitution formula to evaluate the integral.

$$15) \int_0^1 \frac{10r dr}{\sqrt{9+5r^2}}$$

$$A) \frac{\sqrt{14}}{2} - \frac{3}{2}$$

$$B) \sqrt{14} - 3$$

$$C) 2\sqrt{14} - 6$$

$$D) -2\sqrt{14} + 6$$

$$16) \int_1^4 \frac{7-\sqrt{x}}{\sqrt{x}} dx$$

$$A) 11$$

$$B) -\frac{11}{2}$$

$$C) 22$$

$$D) \frac{11}{2}$$

$$17) \int_0^{\pi/2} \frac{\cos x}{(4+5 \sin x)^3} dx$$

$$A) -\frac{65}{2592}$$

$$B) \frac{65}{2592}$$

$$C) \frac{13}{2592}$$

$$D) -\frac{3}{32}$$

## Answer Key

Testname: CAL EXAM 4

- 1) C
- 2) B
- 3) D
- 4) B
- 5) B
- 6) A
- 7) D
- 8) A
- 9) C
- 10) D
- 11) B
- 12) D
- 13) C
- 14) B
- 15) C
- 16) A
- 17) C