Name____ Date___________________________
Period_______________

Practice TEST: AB/BC Methods of Integration (through AB topics)

Part I: MULTIPLE CHOICE (USE CAPITAL LETTERS)

Use a finite approximation to estimate the area of the region enclosed between the graph of f and the x-axis for $a \le x \le b$.

1) $f(x) = x^2$, $a = 3$, $b = 7$ 1) _______

Use LRAM with four rectangles of equal width.

A) 117 B) 86 C) 105 D) 126

2) $f(x) = x^2$, $a = 3$, $b = 7$ 2) _______

Use RRAM with four rectangles of equal width.

A) 117 B) 126 C) 105 D) 86

Estimate the value of the quantity.

3) The table shows the velocity of a remote controlled race car moving along a dirt path for 8 seconds. Estimate the distance traveled by the car using 8 subintervals of length 1 with left-end point values. 3) _______

Time (sec)	Velocity (in./sec)
0	0
1	10
2	20
3	16
4	26
5	29
6	31
7	12
8	5

A) 288 in. B) 144 in. C) 134 in. D) 149 in.

Use the Trapezoidal Rule to estimate the integral.

4) $\int_1^4 f(x)\,dx$ 4) _______

x	1	2	3	4
f(x)	3.6	7.3	10.6	12.6

A) 33.3 B) 36.6 C) 26 D) 28.5

Graph the integrand and use areas to evaluate the integral.

5) $\int_{-5}^{5} \sqrt{25 - x^2}\,dx$ 5) _______

A) 5π B) 25π C) $\frac{25}{2}\pi$ D) 25

6) $\int_{-5}^{5} (5 - |x|)\, dx$ 6) ________

A) 50 B) 25 C) $\frac{25}{2}$ D) 75

Express the desired quantity as a definite integral and evaluate the integral.

7) Find the output of a pump that produces 18 gallons per minute during the first 5 hours of its operation. 7) ________

A) $\int_{0}^{300} 18\, dt$, 90 gal B) $\int_{0}^{300} 18\, dt$, 5400 gal

C) $\int_{0}^{18} 300\, dt$, 5400 gal D) $\int_{0}^{5} 18\, dt$, 90 gal

Solve the problem.

8) Suppose that $\int_{4}^{6} f(x)\, dx = -4$. Find $\int_{4}^{4} f(x)\, dx$ and $\int_{6}^{4} f(x)\, dx$. 8) ________

A) 4; -4 B) 0; 4 C) -4; 4 D) 0; -4

9) Suppose that h is continuous and that $\int_{-2}^{4} h(x)\, dx = 2$ and $\int_{4}^{8} h(x)\, dx = -8$. Find $\int_{-2}^{8} h(t)\, dt$ and $\int_{8}^{-2} h(t)\, dt$. 9) ________

A) 6; -6 B) 10; -10 C) -6; 6 D) -10; 10

USE NINT to find the average value of the function on the interval. At what point in the interval does the function assume its average value?

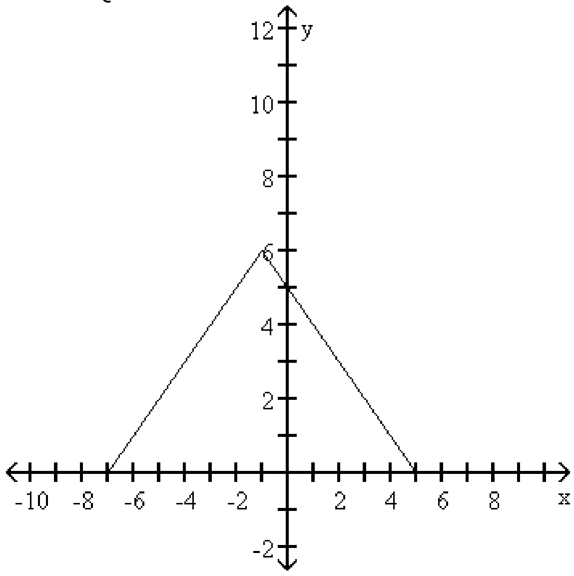
10) $y = -4x^2 - 1$, [0, 3.87298335] 10) ______

A) -61, at x = 3.87298335 B) 21, at x = 2.23606798

C) 61, at x = 3.87298335 D) -21, at x = 2.23606798

Find the average value of the function without integrating, by appealing to the geometry region between the graph and the x-axis.

11) $f(x) = \begin{cases} x + 7, & -7 \le x \le -1 \\ -x + 5, & -1 < x \le 5 \end{cases}$ 11) ______



A) 2 B) 6 C) 3 D) $\frac{7}{2}$

Evaluate the definite integral.

12) $\int_1^e \frac{2}{x}\,dx$ 12) ______

A) $-1e^2$ B) -2 C) 2 D) 0

Find the average value over the given interval.

13) $y = 7 \sin x$; $[0, \pi]$ 13) ______

A) $\frac{7}{\pi}$ B) $\frac{14}{\pi}$ C) $\frac{98}{\pi}$ D) $\frac{2}{\pi}$

Find dy/dx.

14) $\int_0^{x^{10}} \cos \sqrt{t}\,dt$ 14) ______

A) $\cos(x^5) - 1$ B) $\sin(x^5)$ C) $\cos(x^5)$ D) $10x^9 \cos(x^5)$

15) $\int_0^{6 \ln x} e^t\,dt$ 15) ______

A) $6x^5$ B) x^6 C) $x^6 - 1$ D) $\frac{6e^{x^6}}{x}$

Construct a function of the form $y = \int_a^x f(t)\,dt + C$ that satisfies the given conditions.

16) $\frac{dy}{dx} = \csc x$, and $y = -9$ when $x = 4$ 16) ______

A) $y = -\int_4^x \csc t \cot t\,dt - 9$
B) $y = \int_x^4 \csc t\,dt - 9$
C) $y = \int_{-9}^x \csc t\,dt + 4$
D) $y = \int_4^x \csc t\,dt - 9$

Evaluate the integral.

17) $\int_3^{-1} 4^x\,dx$ 17) ______

A) $\frac{-63}{4 \ln 4}$
B) $\frac{65}{4 \ln 4}$
C) $\frac{-257}{4 \ln 4}$
D) $\frac{-255}{4 \ln 4}$

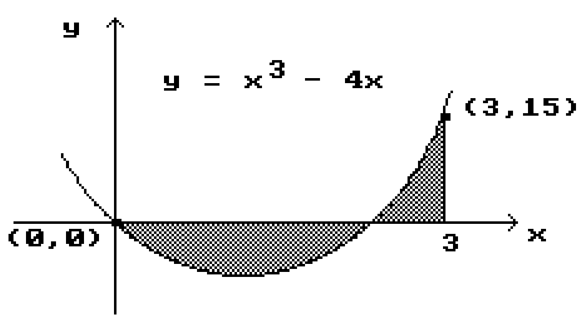
Find the total area of the region between the curve and the x-axis.

18) $y = x^2 - 6x + 9;\ 2 \le x \le 4$ 18) ______

A) $\frac{7}{3}$
B) $\frac{1}{3}$
C) $\frac{4}{3}$
D) $\frac{2}{3}$

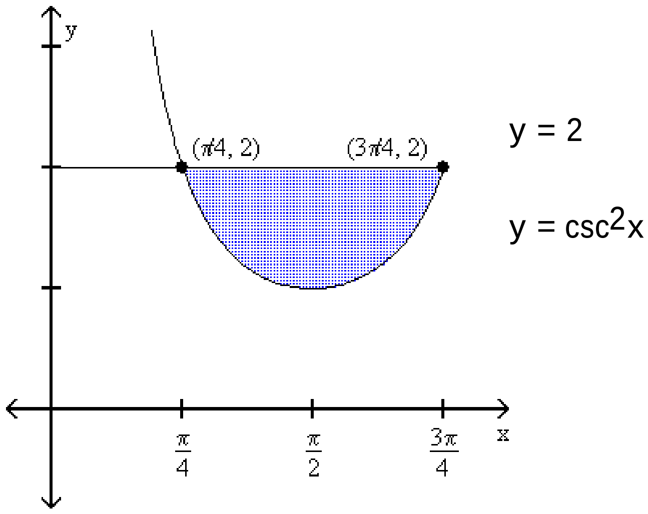
Find the area of the shaded region.

19) 19) ______



A) $\frac{9}{4}$
B) $\frac{33}{4}$
C) $\frac{41}{4}$
D) $\frac{17}{4}$

20) 20) ______



A) $\pi + 2$ B) π C) $\pi - 2$ D) 2

Use NINT to solve the problem.

21) Evaluate $\int_0^{10} \frac{1}{4 + 3\cos x}\,dx$. 21) ______

A) ≈ 0.026 B) ≈ 0.022 C) ≈ 3.107 D) ≈ 4.064

Solve the problem.

22) Find the linearization of $f(x) = 9 + \int_1^{x+1} \tan \frac{\pi t}{4}\,dt$ at $x = 0$. 22) ______

A) $9x + 1$ B) 9 C) $\sqrt{2}x + 9$ D) $x + 9$

Evaluate the integral.

23) $\int \frac{x}{3x^2 - 6}dx$ 23) ______

A) $\frac{x}{(3x^2 - 6)^2} + C$ B) $\frac{1}{6} \ln\left|3x^2 - 6\right| + C$

C) $-\frac{6}{(3x^2 - 6)^2} + C$ D) $x \ln\left|3x^2 - 6\right| + C$

24) $\int 7x^2 \sqrt[4]{4 + 3x^3}\,dx$ 24) ______

A) $\frac{28}{5}(4 + 3x^3)^{5/4} + C$ B) $-\frac{14}{3}(4 + 3x^3)^{-3/4} + C$

C) $\frac{28}{45}(4 + 3x^3)^{5/4} + C$ D) $7(4 + 3x^3)^{5/4} + C$

25) $\int \frac{\ln^9 x}{x}dx$ 25) ______

A) $\ln^{10} x + C$ B) $\frac{\ln^8 x}{8} + C$ C) $\frac{\ln^{10} x}{10x} + C$ D) $\frac{\ln^{10} x}{10} + C$

26) $\int \frac{dx}{x \ln x^6}$ 26) _______

A) $\ln(\ln x^6) + C$ B) $\frac{1}{6}\ln(\ln x^6) + C$ C) $\ln x^6 + C$ D) $\frac{1}{6}\ln x^6 + C$

27) $\int \frac{dx}{x^2 + 25}$ 27) _______

A) $\frac{1}{10}\tan^{-1}\left(\frac{x}{5}\right) + C$ B) $\frac{1}{25}\tan^{-1}\left(\frac{x}{25}\right) + C$

C) $\frac{1}{25}\tan^{-1}\left(\frac{x}{5}\right) + C$ D) $\frac{1}{5}\tan^{-1}\left(\frac{x}{5}\right) + C$

28) $\int \frac{dx}{\sin^2(5x)}$ 28) _______

A) $\frac{1}{5}\cot 5x + C$ B) $\frac{1}{3}\csc^3 5x + C$

C) $-\frac{1}{5}\cot 5x + C$ D) $-\cot 5x \csc 5x + C$

29) $\int \tan^5 x \sec^2 x \, dx$ 29) _______

A) $\frac{1}{6}\sec^6 x + C$ B) $\frac{1}{6}\tan^6 x + C$

C) $-6\tan^6 x + C$ D) $\frac{1}{5}\tan^5 x \sec x + C$

30) $\int \frac{1}{\cot(9x - 5)} dx$ 30) _______

A) $-\frac{1}{9}\ln|\cos(9x - 5)| + C$ B) $-\ln|\cos(9x - 5)| + C$

C) $\frac{1}{9}\ln|\cos(9x - 5)| + C$ D) $\ln|\sin(9x - 5)| + C$

31) $\int \frac{\sin t}{(3 + \cos t)^3} dt$ 31) _______

A) $\frac{2}{(3 + \cos t)^2} + C$ B) $\frac{1}{4(3 + \cos t)^4} + C$

C) $\frac{1}{(3 + \cos t)^2} + C$ D) $\frac{1}{2(3 + \cos t)^2} + C$

32) $\int \frac{\cos(4\theta + 5)}{\sin^2(4\theta + 5)} d\theta$ 32) ______

A) $\frac{1}{4\sin(4\theta + 5)} + C$

B) $-\frac{\cos(4\theta + 5)}{4\sin(4\theta + 5)} + C$

C) $-\frac{1}{4\sin(4\theta + 5)} + C$

D) $\frac{1}{\sin(4\theta + 5)} + C$

33) $\int \tan^2 4x\,dx$ 33) ______

A) $\frac{1}{4}\tan 4x \sec 4x - x + C$

B) $x - \frac{1}{4}\tan 4x + C$

C) $4\tan 4x - x + C$

D) $\frac{1}{4}\tan 4x - x + C$

Use the given trig identity to set up a u-substitution and then evaluate the indefinite integral.

34) $\int (\cos^4 6x - \sin^4 6x)\,dx$, $\cos 12x = \cos^2 6x - \sin^2 6x$ 34) ______

A) $-\frac{1}{12}\cos 12x + C$

B) $\frac{1}{5}\cos^5 6x - \frac{1}{5}\sin^5 6x + C$

C) $\frac{1}{3}\cos^3 12x - \frac{1}{3}\sin^3 12x + C$

D) $\frac{1}{12}\sin 12x + C$