Name: Last ____________________. First ____________________

You must show your work and/or provide explanations for your answers for all questions. Otherwise, no credit will be given.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

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 $x = 0$ and $x = 3$ using an upper sum with two rectangles of equal width. 1) ________

A) 3.375 B) 16.875 C) 12.5 D) 8.4375

Write the sum without sigma notation and evaluate it.

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

A) $2 \sin \pi + 2 \sin \frac{\pi}{2} + 2 \sin \frac{\pi}{3} + 2 \sin \frac{\pi}{4} = 6 + \sqrt{2}$

B) $2 \sin \pi + 2 \sin \frac{\pi}{2} + 2 \sin \frac{\pi}{3} + 2 \sin \frac{\pi}{4} = 2 + \sqrt{3} + \sqrt{2}$

C) $2 \sin \pi + 2 \sin \frac{\pi}{2} + 2 \sin \frac{\pi}{3} + 2 \sin \frac{\pi}{4} = 1 + \frac{\sqrt{3} + \sqrt{2}}{2}$

D) $2 \sin \pi + 2 \sin \frac{\pi}{4} = \sqrt{2}$

Solve the problem.

3) Suppose that g is continuous and that $\int_2^6 g(x)\,dx = 12$ and $\int_2^9 g(x)\,dx = 16$. Find $\int_9^6 g(x)\,dx$. 3) ________

A) −4 B) 28 C) −28 D) 4

Evaluate the integral.

4) $\int_0^4 2\sqrt{x}\,dx$ 4) ________

A) 16 B) 4 C) 24 D) $\frac{32}{3}$

5) $\int_1^2 \left(t + \frac{1}{t}\right)^2 dx$ 5) ________

A) $\frac{15}{2}$ B) $\frac{29}{6}$ C) $\frac{37}{6}$ D) $\frac{5}{6}$

Find the derivative.

6) $y = \int_0^x \sqrt{10x + 5}\, dt$ 6) ________

A) $\frac{5}{\sqrt{10x + 5}}$ B) $\frac{1}{15}(10x + 5)^{3/2}$ C) $\sqrt{10x + 5}$ D) $\sqrt{10x + 5} - \sqrt{5}$

7) $y = \int_{x^4}^0 \cos\sqrt{t}\, dt$ 7) ________

A) $-4x^3 \cos(x^2)$ B) $4x^3 \cos(x^2)$ C) $1 - \cos(x^2)$ D) $-\sin(x^2)$

8) $\int_1^{x^{1/2}} e^{(t^2 + 1)}\, dt$ 8) ________

A) $\frac{e^{x+1} - e^2}{2\, x^{1/2}}$ B) $\frac{e^{x+1}}{2\, x^{1/2}}$ C) e^{x+1} D) e^{x^2+1}

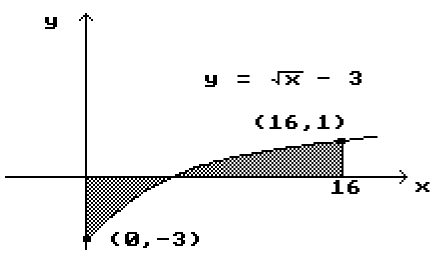
Find the total area of the region between the curve and the x-axis.

9) $y = x^2(x - 2)^2;\ 0 \le x \le 2$ 9) ________

A) $\frac{15}{17}$ B) $\frac{16}{15}$ C) $\frac{15}{16}$ D) $\frac{17}{15}$

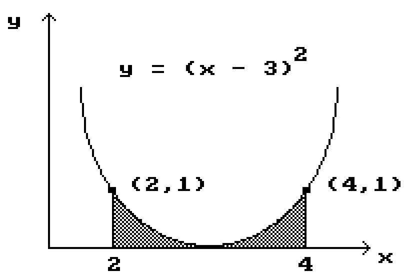
Find the area of the shaded region.

10) 10) ________



A) $\frac{38}{3}$ B) $\frac{29}{3}$ C) $\frac{22}{3}$ D) $\frac{16}{3}$

11) 11) ________



A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{3}$ D) $\frac{4}{3}$

Solve the initial value problem.

12) $\frac{dy}{dx} = 12 \sin^2 x \cos x,\ y(0) = 2$ 12) _______

A) $y = 4 \sin^3 x + 2$

B) $y = 24 \sin x \cos x + 2$

C) $y = -4 \sin^3 x - 2$

D) $y = 6 \cos^2 x + 2$

Solve the problem.

13) Suppose that $\int_1^x f(t)\, dt = 5x^2 + 9x - 2$. Find f(x). 13) _______

A) $10x + 9$

B) $\frac{5}{3}x^3 + \frac{5}{3}x^2 - 2x - 12$

C) $\frac{5}{3}x^3 + \frac{9}{2}x^2 - 2x$

D) $5x^2 + 9x - 2$

14) Suppose that f has a positive derivative for all values of x and that f(2) = 0. Which of the following statements must be true of the function $g(x) = \int_0^x f(t)\, dt$? 14) _______

A) The function g has a local minimum at x = 2.

B) The graph of g has an inflection point at x = 2.

C) The graph of g crosses the x–axis at x = 2.

D) The function g has a local maximum at x = 2.

Evaluate the integral.

15) $\int x^5 \sqrt{x^6 + 8}\, dx$ 15) _______

A) $4\left(x^6 + 8\right)^{3/2} + C$

B) $\frac{2}{3}\left(x^6 + 8\right)^{3/2} + C$

C) $-\frac{1}{3}\left(x^6 + 8\right)^{-1/2} + C$

D) $\frac{1}{9}\left(x^6 + 8\right)^{3/2} + C$

16) $\int \frac{\sin t}{(9 + \cos t)^4}\, dt$ 16) _______

A) $\frac{1}{3(9 + \cos t)^3} + C$

B) $\frac{1}{5(9 + \cos t)^5} + C$

C) $\frac{3}{(9 + \cos t)^3} + C$

D) $\frac{1}{(9 + \cos t)^3} + C$

17) $\int \frac{e^x\, dx}{\sqrt{1 - e^{2x}}}$ 17) _______

A) $-2\sqrt{1 - e^{2x}} + C$

B) $\sec^{-1}(e^x) + C$

C) $\sin^{-1}(e^x) + C$

D) $e^x \sin^{-1}(e^x) + C$

18) $\int \frac{dt}{3(\tan^{-1} t)(1 + t^2)}$ 18) _______

A) $3 \cot^{-1} t + C$

B) $\frac{1}{3(\tan^{-1} t)^2} + C$

C) $\frac{1}{3} \ln \left| \tan^{-1} t \right| + C$

D) $\ln \left| 3 \tan^{-1} t \right| + C$

Evaluate the integral by using multiple substitutions.

19) $\int 3(3x^2 - 7) \sin^5 (x^3 - 7x) \cos (x^3 - 7x) \, dx$ 19) _______

A) $\frac{1}{2} \sin^6 (x^3 - 7x) + C$

B) $15 \sin^4 (x^3 - 7x) + C$

C) $\frac{1}{2} \cos^6 (3x^2) + C$

D) $2 \sin^6 (x^3 - 7x) + C$

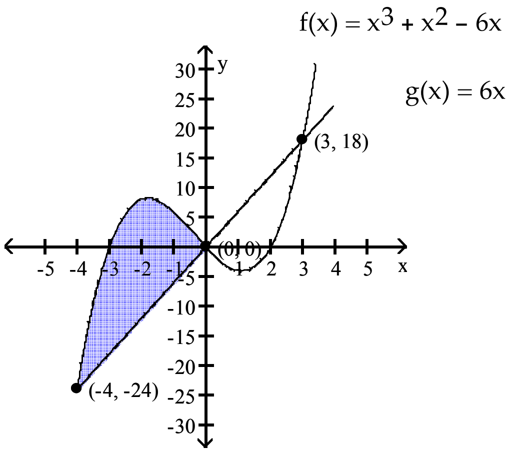
Use the substitution formula to evaluate the integral.

20) $\int_{\pi}^{3\pi/2} \frac{\sin \theta \, d\theta}{2 + \cos \theta}$ 20) _______

A) $-\ln 2$ B) $-\ln 3$ C) 0 D) $\ln 3$

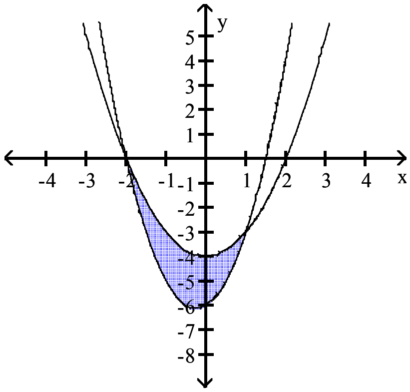
Find the area of the shaded region.

21) 21) _______



A) $\frac{81}{12}$ B) $\frac{640}{12}$ C) $\frac{343}{12}$ D) $\frac{768}{12}$

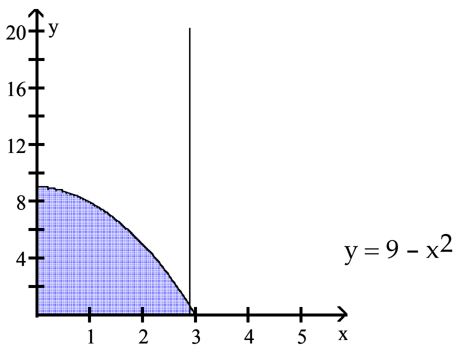
22) $y = 2x^2 + x - 6 \quad y = x^2 - 4$ 22) _______



A) $\frac{9}{2}$ B) $\frac{19}{3}$ C) $\frac{11}{6}$ D) $\frac{8}{3}$

Find the volume of the solid generated by revolving the shaded region about the given axis.

23) About the x–axis 23) _______



A) 18π B) $\frac{1053}{5}\pi$ C) $\frac{648}{5}\pi$ D) $\frac{3159}{5}\pi$

1) B
2) B
3) A
4) D
5) B
6) C
7) A
8) B
9) B
10) A
11) B
12) A
13) A
14) A
15) D
16) A
17) C
18) C
19) A
20) A
21) B
22) A
23) C