2413 - Practice 4 (Final) - Spr 18

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

Evaluate the integral.

1) $\int_0^{\pi/8} \frac{\sec^2(2x)}{2 + \tan(2x)}\,dx$ 1) _____

A) $\ln\left|\frac{3}{2}\right|$ B) $e^{3/2}$ C) $\frac{1}{2}\ln\left|\frac{1}{2}\right|$ D) $\frac{1}{2}\ln\left|\frac{3}{2}\right|$

2) $\int \frac{e^{1/x}}{5x^2}dx$ 2) _____

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

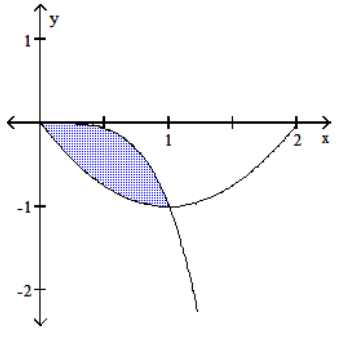
3) $\int \frac{6 + 12x}{9 + 36x^2}\,dx$ 3) _____

A) $\sin^{-1}(2x) + \frac{1}{6}\ln\left|9 + 36x^2\right| + C$ B) $\frac{1}{3}\tan^{-1}(2x) + \frac{1}{6}\ln\left|9 + 36x^2\right| + C$

C) $\frac{1}{3}\tan^{-1}(2x) + \frac{1}{3}\sin^{-1}(2x) + C$ D) $72x + \frac{1}{6}\ln\left|9 + 36x^2\right| + C$

Find the area of the shaded region.

4) 4) _____

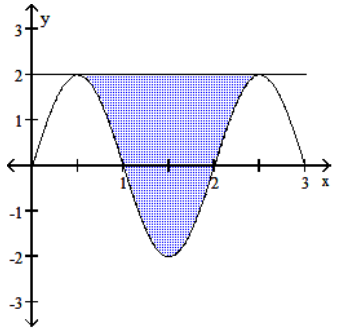


$y = -x^4$

$y = x^2 - 2x$

A) $\frac{7}{15}$ B) $\frac{76}{15}$ C) $\frac{22}{15}$ D) 2

5) 5) _____



$y = 2$

$y = 2\sin(\pi x)$

A) $4 + \frac{4}{\pi}$ B) 8 C) $\frac{4}{\pi}$ D) 4

Find the derivative of the function.

6) $y = \frac{4 - 2x^4 + x^5}{x^9}$ 6) _____

A) $\frac{dy}{dx} = -\frac{36}{x^{10}} + \frac{10}{x^6} - \frac{4}{x^5}$ B) $\frac{dy}{dx} = \frac{36}{x^{10}} - \frac{10}{x^6} + \frac{4}{x^6}$

C) $\frac{dy}{dx} = -\frac{36}{x^8} + \frac{10}{x^4} - \frac{4}{x^3}$ D) $\frac{dy}{dx} = -36x^{10} + 10x^6 - 4x^5$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

7) $u(2) = 6$, $u'(2) = 4$, $v(2) = -3$, $v'(2) = -5$. 7) _____

$\frac{d}{dx}\left(\frac{u}{v}\right)$ at $x = 2$

A) $\frac{18}{25}$ B) - 6 C) 2 D) $-\frac{14}{3}$

Use implicit differentiation to find dy/dx.

8) $x^3 + 3x^2y + y^3 = 8$ 8) _____

A) $\frac{x^2 + 2xy}{x^2 + y^2}$ B) $-\frac{x^2 + 2xy}{x^2 + y^2}$ C) $\frac{x^2 + 3xy}{x^2 + y^2}$ D) $-\frac{x^2 + 3xy}{x^2 + y^2}$

Using the derivative of f(x) given below, determine the intervals on which f(x) is increasing or decreasing.

9) $f'(x) = x^{1/3}(x - 1)$ 9) _____

A) Decreasing on $(0, 1)$; increasing on $(1, \infty)$

B) Increasing on $(0, \infty)$

C) Decreasing on $(0, 1)$; increasing on $(-\infty, 0) \cup (1, \infty)$

D) Decreasing on $(-\infty, 0) \cup (1, \infty)$; increasing on $(0, 1)$

Find the derivative.

10) $\frac{d}{dt}\int_0^{\sin t} \frac{1}{9 - u^2}\,du$ 10) _____

A) $\frac{1}{\cos t\,(9 - \sin^2 t)}$

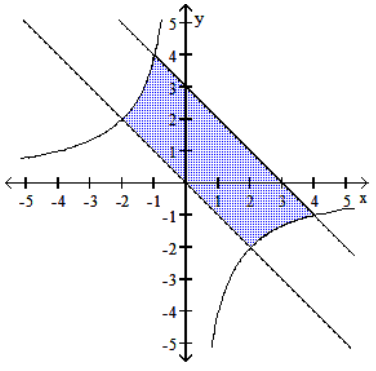
B) $\frac{\cos t}{9 - \sin^2 t}$

C) $\frac{-\cos t}{9 - \sin^2 t}$

D) $\frac{1}{9 - \sin^2 t}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

11) In the figure below, the region enclosed by the curves $y = -\frac{4}{x}$, $y = -x$, and $y = -x + 3$ is shown. Set up an integral or sum of integrals to find the area of the shaded region. (DO NOT evaluate the integral, just set it up.) 11) _____

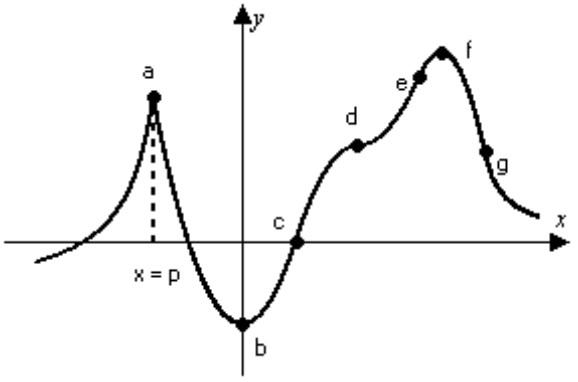


Evaluate the integral.

12) $\int_0^{\sqrt{3}/2} \frac{(\sin^{-1} x)^2}{\sqrt{1 - x^2}}\,dx$ 12) _____

Provide an appropriate response.

13) The accompanying figure shows a portion of the graph of a function that is twice-differentiable at all x except at x = p. At each of the labeled points, classify y′ and y″ as positive, negative, or zero. 13) _____



14) Find d^{998}/dx^{998} (cos x). 14) _____

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

Evaluate the integral.

15) $\int \frac{dx}{x(5 + 8 \ln x)}$

16) $\int_0^{\sqrt{\ln \pi}} 2x\, e^{x^2} \sin\left(e^{x^2}\right) dx$

17) $\int_1^4 \frac{t^2 + 1}{\sqrt{t}}\, dt$

Provide an appropriate response.

18) Find the linearization of $f(x) = 3 + \int_1^{x+1} \tan \frac{\pi t}{4}\, dt$ at $x = 0$.

Find $\frac{dy}{dx}$.

19) $e^{xy} = \sin x$

1) D
2) C
3) B
4) A
5) D
6) A
7) C
8) B
9) C
10) B
11) $\int_{-2}^{-1} \left(-\frac{4}{x} + x \right) dx + \int_{-1}^{2} 3\, dx + \int_{2}^{4} \left(-x + 3 + \frac{4}{x} \right) dx$
12) $\frac{\pi^3}{81}$
13) a: both y′ and y″ are undefined.
b: y′ =0 and y″ > 0
c: y′ > 0 and y″ = 0
d: y′ = 0 and y″ = 0
e: y′ > 0 and y″ = 0
f: y′ = 0 and y″ < 0
g: y′ < 0 and y″ = 0
14) - cos x
15) $\frac{1}{8} \ln \left| 5 + 8 \ln x \right| + C$
16) 1 + cos 1
17) $\frac{72}{5}$
18) x + 3
19) $\frac{\cos x - ye^{xy}}{xe^{xy}}$