2413 - Practice Exam 4 - Spr 18

MULTIPLE CHOICE. (5pts each) Choose the one alternative that best completes the statement or answers the question. Write your answer in the space provided. No partial credit.

Evaluate the integral.

1) $\int \frac{\sec x \tan x}{5 + \sec x}\, dx$ 1) _____

A) $\ln|5 + \sec x| + C$
B) $5 \ln|\sec x| + C$
C) $5 \ln|5 + \sec x| + C$
D) $-\ln|5 + \sec x| + C$

2) $\int x^3 e^{-x^4}\, dx$ 2) _____

A) $e^{-x^4} + C$
B) $-\frac{1}{4}e^{-x^4} + C$
C) $-\frac{1}{4}e^{-x^5} + C$
D) $-4e^{-x^5} + C$

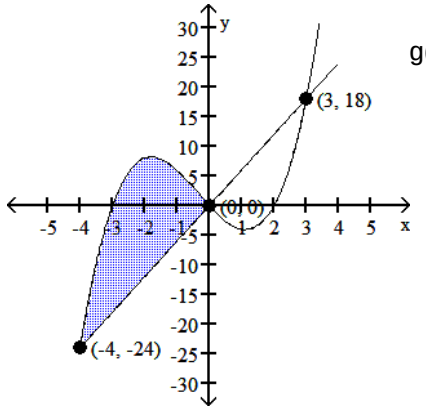
3) $\int \frac{9\, dx}{\sqrt{4 - 81x^2}}$ 3) _____

A) $\frac{1}{2}\tan^{-1}\left(\frac{9}{2}x\right) + C$
B) $\sin^{-1}\left(\frac{9}{2}x\right) + C$
C) $\frac{1}{2}\sin^{-1}\left(\frac{9}{2}x\right) + C$
D) $\tan^{-1}\left(\frac{9}{2}x\right) + C$

Find the area of the shaded region.

4) $f(x) = x^3 + x^2 - 6x$ 4) _____

$g(x) = 6x$



A) $\frac{768}{12}$
B) $\frac{81}{12}$
C) $\frac{937}{12}$
D) $\frac{343}{12}$

Find the area enclosed by the given curves.

5) $y = \sin x$, $y = \csc^2 x$, $\frac{\pi}{3} \le x \le \frac{\pi}{2}$ 5) _____

A) $1 - \frac{\sqrt{3}}{2}$
B) $\frac{\sqrt{3}}{2} - \frac{1}{2}$
C) $\frac{\sqrt{3}}{3} - \frac{1}{2}$
D) $\frac{\sqrt{3}}{3} + \frac{1}{2}$

Find the derivative.

6) $r = \frac{3}{s^3} - \frac{5}{s}$ 6) _____

A) $-\frac{9}{s^4} + \frac{5}{s^2}$ B) $\frac{3}{s^4} - \frac{5}{s^2}$ C) $\frac{9}{s^4} - \frac{5}{s^2}$ D) $-\frac{9}{s^2} + \frac{5}{s^2}$

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) $u(2) = 10, u'(2) = 3, v(2) = -2, v'(2) = -5.$ 7) _____

$\frac{d}{dx}(uv)$ at $x = 2$

A) 40 B) -56 C) -44 D) 56

Use implicit differentiation to find dy/dx.

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

A) $\frac{2xy^2 + y + 1}{-2x^2y - x - 1}$ B) $\frac{2xy^2 - y}{2x^2y + x}$ C) $\frac{2xy^2 + y}{2x^2y - x}$ D) $\frac{2xy^2 - y - 1}{-2x^2y + x + 1}$

Identify the function's local and absolute extreme values, if any, saying where they occur.

9) $g(x) = \frac{x^4}{4} - \frac{2}{3}x^3 - \frac{5}{2}x^2 + 6x + 4$ 9) _____

A) local maximum at $x = -2$; local minimum at $x = 3$
B) local maxima at $x = -2$ and $x = 3$; local minimum at $x = 1$
C) local maxima at $x = 2$ and $x = -3$; local minimum at $x = 1$
D) local maximum at $x = 1$; local minima at $x = -2$ and $x = 3$

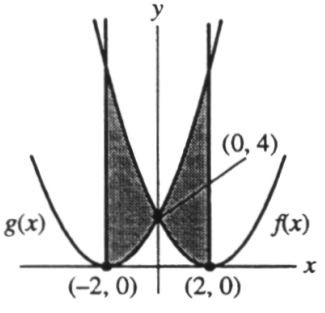
Find the derivative.

10) $\frac{d}{d\theta}\int_{\pi/4}^{\cot\theta} \csc^2 y\, dy$ 10) _____

A) $-\csc^3\theta \cot\theta$ B) $-\csc^2\theta \csc^2(\cot\theta)$
C) $\csc^2\theta \cot\theta$ D) $\csc^2(\cot\theta)$

SHORT ANSWER. (5pts each) Write the word or phrase that best completes each statement or answers the question. Write your answer in the space provided. No partial credit.

11) Refer to the information in the graph below. Given functions $f(x) = x^2 + 4x + 4$ and $g(x) = x^2 - 4x + 4$, set up a definite integral or sum of definite integrals that gives the area of the shaded portion. 11) _____



Evaluate the integral.

12) $\int -e^{\cos^{-1} x} \frac{dx}{\sqrt{1 - x^2}}$ 12) _____

Solve the problem.

13) The first and second derivatives of the function f(x) have the values given in the table. (a) Find the x-coordinates of all relative extreme points. (b) Find the x-coordinates of all inflection points. 13) _____

x	f′(x)	f″(x)
$0 \le x < 3$	Positive	Negative
3	0	0
$3 < x < 6$	Positive	Positive
6	Positive	0
$6 < x < 7$	Positive	Negative
7	0	Negative
$7 < x \le 12$	Negative	Negative

Find dy/dt.

14) $y = (1 + \sin(10t))^{-4}$ 14) _____

ESSAY. (6pts each) Write your answer in the space provided or on a separate sheet of paper. Show all work. Answers with no work or insufficient work will receive no credit. Partial credit may be given for correct work.

Evaluate the integral.

15) $\int \frac{8\,dx}{9 - 2x}$

16) $\int \frac{e^{5\theta}}{1 + e^{5\theta}} d\theta$

17) $\int \left(e^{x} + e^{-x}\right)^2 dx$

Provide an appropriate response.

18) Suppose that $\int_1^x f(t)\, dt = 4x^2 + 7x - 3$. Find f(x).

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

19) $e^{8y} = \cos(5x + y)$

1) A
2) B
3) B
4) C
5) C
6) A
7) B
8) D
9) D
10) B
11) $\int_{-2}^{0} 8x\,dx + \int_{0}^{2} -8x\,dx$
12) $e^{\cos^{-1} x} + C$
13) (a) x = 7
(b) x = 3, x = 6
14) $-40(1 + \sin 10t)^{-5} \cos 10t$
15) $-4 \ln|-9 + 2x| + C$
16) $\frac{\ln(1 + e^{5\theta})}{5} + C$
17) $\frac{1}{2}\left(e^{2x} - e^{-2x}\right) + 2x + C$
18) 8x + 7
19) $\frac{-5 \sin(5x + y)}{8e^{8y} + \sin(5x + y)}$