

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) $\sin^{-1}(2x) + \frac{1}{6} \ln |9 + 36x^2| + C$

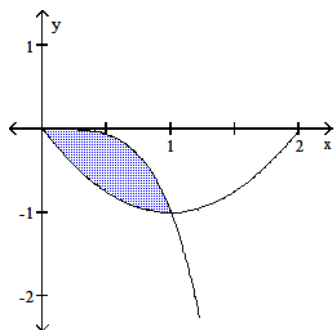
B) $\frac{1}{3} \tan^{-1}(2x) + \frac{1}{6} \ln |9 + 36x^2| + C$

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

D) $72x + \frac{1}{6} \ln |9 + 36x^2| + C$

Find the area of the shaded region.

4) 4) _____



$y = -x^4$

$y = x^2 - 2x$

A) $\frac{7}{15}$

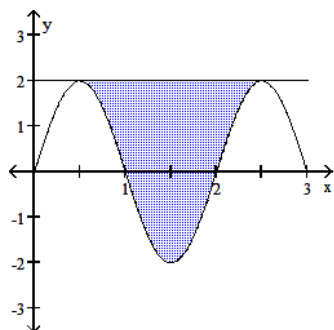
B) $\frac{76}{15}$

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) _____

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

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

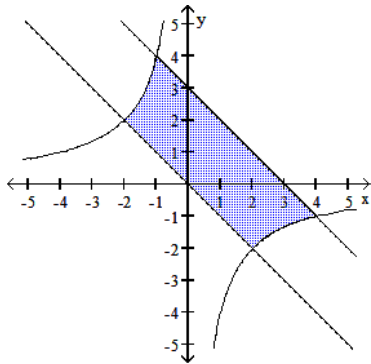
D) $\frac{1}{9 - \sin^2 t}$

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

11) _____

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.)



Evaluate the integral.

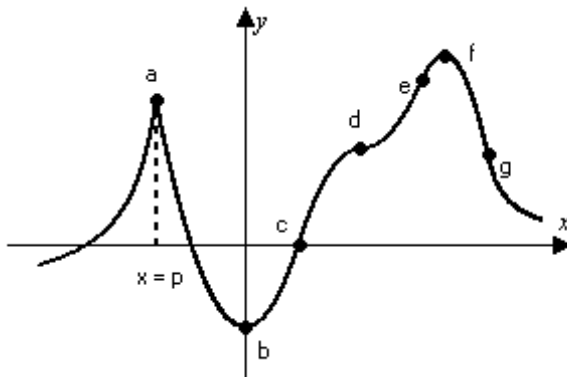
$$12) \int_0^{\sqrt{3}/2} \frac{(\sin^{-1} x)^2}{\sqrt{1 - x^2}} dx$$

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 $\frac{d^{998}}{dx^{998}} (\cos x)$.

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

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

Provide an appropriate response.

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

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

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