

Practice Exam 1 - Calculus I - Spring 2018

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

Give an appropriate answer.

1) Let $\lim_{x \rightarrow 6} f(x) = -2$ and $\lim_{x \rightarrow 6} g(x) = 4$. Find $\lim_{x \rightarrow 6} \left[\frac{7f(x) - 7g(x)}{10 + g(x)} \right]$. 1) _____

- A) - 3 B) 1 C) $-\frac{42}{5}$ D) 6

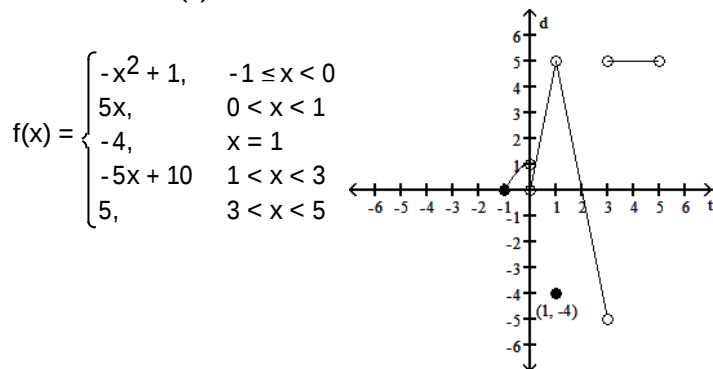
Find the limit, if it exists.

2) $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 5x + 6}$ 2) _____

- A) Does not exist B) 6 C) 0 D) 3

Answer the question.

3) Is f continuous at $f(1)$? 3) _____



- A) No B) Yes

Find numbers a and b , or k , so that f is continuous at every point.

4) 4) _____

$$f(x) = \begin{cases} x^2, & x < -5 \\ ax + b, & -5 \leq x \leq -2 \\ x + 6, & x > -2 \end{cases}$$

- A) $a = 7, b = -10$ B) $a = -7, b = 10$ C) $a = -7, b = -10$ D) Impossible

Find the derivative of the function.

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

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

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

6) _____

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

A) $-\frac{14}{3}$

B) 2

C) $\frac{18}{25}$

D) - 6

Provide an appropriate response.

7) Find all points (x, y) on the graph of $f(x) = 2x^2 - 3x$ with tangent lines parallel to the line $y = 9x + 9$.

7) _____

A) (3, 18)

B) (0, 0), (3, 9)

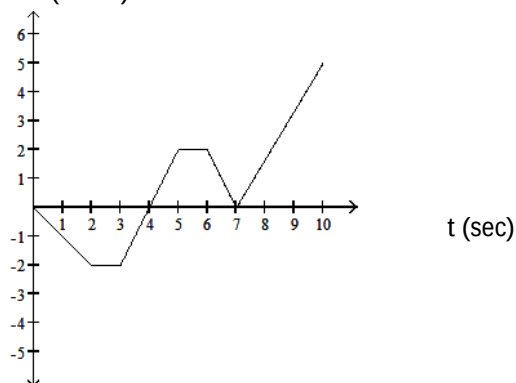
C) (6, 9)

D) (3, 9)

The figure shows the velocity v of a body moving along a coordinate line as a function of time t . Use the figure to answer the question.

8) v (ft/sec)

8) _____



What is the body's acceleration when $t = 4$ sec?

A) 0 ft/sec²

B) 1 ft/sec²

C) - 2 ft/sec²

D) 2 ft/sec²

Find the indicated derivative.

9) Find y'' if $y = 8x \sin x$.

9) _____

A) $y'' = 8 \cos x - 16x \sin x$

B) $y'' = -16 \cos x + 8x \sin x$

C) $y'' = -8x \sin x$

D) $y'' = 16 \cos x - 8x \sin x$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x . Find the derivative with respect to x of the given combination at the given value of x .

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	16	6	5
4	3	3	5	-5

10) _____

$\sqrt{f(x) + g(x)}$, $x = 3$

A) $\frac{11}{\sqrt{17}}$

B) $\frac{1}{2\sqrt{17}}$

C) $\frac{11}{2\sqrt{17}}$

D) $-\frac{1}{2\sqrt{17}}$

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

Solve the problem.

- 11) A rock is thrown vertically upward from the surface of an airless planet. It reaches a height of $s = 120t - 3t^2$ meters in t seconds. How high does the rock go? How long does it take the rock to reach its highest point? 11) _____

Provide an appropriate response.

- 12) Find $d^{998}/dx^{998} (\cos x)$. 12) _____

ESSAY. 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.

Find the limit analytically. Show all work and clearly explain your reasoning.

13) $\lim_{t \rightarrow 0} \sec \left(\frac{-2\pi t}{\sin t} \right)$

Solve the problem. Show all work and clearly explain your reasoning.

- 14) Does the graph of the function $y = 6x + 12 \sin x$ have any horizontal tangents in the interval $0 \leq x \leq 2\pi$? If so, where?

Find dy/dt .

15) $y = \cos(\sqrt{4t + 12})$

Provide an appropriate response.

16) The curves $y = ax^2 + b$ and $y = 2x^2 + cx$ have a common tangent line at the point $(-1, 0)$. Find a , b , and c .

17) Find the value of a that makes the following function differentiable for all x -values. $g(x) = \begin{cases} ax, & \text{if } x < 0 \\ x^2 - 4x, & \text{if } x \geq 0 \end{cases}$