Cho Kit CHAN **MATH1510_202122T1**

Assignment WW2_202122T1 due 10/16/2021 at 11:00pm HKT

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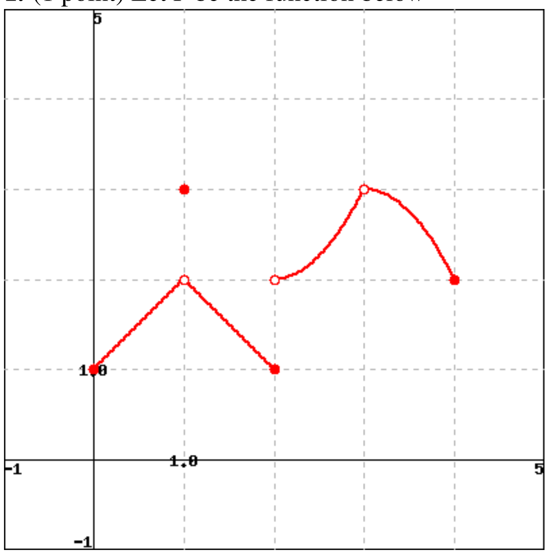
1. (1 point) Let F be the function below



(Click on graph to enlarge)

Evaluate the following expressions.

Note: Enter 'DNE' if the limit does not exist or is not defined.

You can just write 'yes' or 'no' for the yes/no questions.

a) $\lim_{x\to 1} F(x)$ = ___ b) Is $F(x)$ continuous at $x=1$ ___

c) $\lim_{x\to 2} F(x)$ = ___ d) Is $F(x)$ continuous at $x=2$ ___

e) $\lim_{x\to 3} F(x)$ = ___ f) Is $F(x)$ continuous at $x=3$ ___

Answer(s) submitted:

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-
-
-
-

(incorrect)

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2. (1 point) Let

$$f(x) = \begin{cases} -1+x, & \text{if } x<3 \\ 5-x, & \text{if } x \geq 3 \end{cases}$$

Evaluate the following expressions.

$\lim_{x\to 3^-} f(x) =$ ______

$\lim_{x\to 3^+} f(x) =$ ______

$f(3) =$ ______

Is the function f continuous at 3? [?]

Answer(s) submitted:

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-
-

(incorrect)

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3. (1 point)

Consider the function $f(x) = 3x^3+3x^2+10$. For what values of k does the Intermediate Value Theorem tell us that there is a c in the interval $[0,1]$ such that $f(c)=k$?

___ $\leq k \leq$ ___.

Answer(s) submitted:

-
-

(incorrect)

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4. (1 point) Compute the derivative of the given function.

$$f(x) = 9x^{\pi}+4.3x^{4.3}+\pi^{4.3}.$$

Note: Use **pi** for π in your answer.

$f'(x) =$ ______.

Answer(s) submitted:

-

(incorrect)

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5. (1 point) Let $f(x) = \dfrac{1}{\left(x^2-\frac{6}{x}\right)^3}$. Find $f'(x)$.

$f'(x) =$ ______

Answer(s) submitted:

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(incorrect)

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6. (1 point) (a) Let $f(x)=\sqrt{9+13x^4}$. Find $f'(x)$.

$f'(x) =$ ______

(b) Let $f(x) = e^{\sqrt{9+13x^4}}$. Find $f'(x)$.

$f'(x) =$ ______

Answer(s) submitted:

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(incorrect)

7. (1 point)
Find the derivative of
$z(x) = \sqrt[3]{6^x + 7}$

$z'(x) =$ ________
Answer(s) submitted:

-

(incorrect)

8. (1 point) Let

$$y = (4 + \cos^2 x)^{13}$$

$\dfrac{dy}{dx} =$ ________
Answer(s) submitted:

-

(incorrect)

9. (1 point)
Calculate the derivative using the appropriate rule or combination of rules.

$$f(x) = \frac{e^x}{(e^x + 5)(x + 3)}$$

$f'(x) =$ ________
Answer(s) submitted:

-

(incorrect)

10. (1 point) Let $f(x) = \log_2(7x^2 - 4x + 6)$. Find $f'(x)$.
$f'(x) =$ ________
Answer(s) submitted:

-

(incorrect)

11. (1 point) Let $f(x) = 5^{\sin(x)}$.
$f'(x) =$ ________.
Answer(s) submitted:

-

(incorrect)

12. (1 point)
Let $F(x) = f(x^6)$ and $G(x) = (f(x))^6$. You also know that $a^5 = 3, f(a) = 2, f'(a) = 12, f'(a^6) = 11$.
Find $F'(a) =$ ____ and $G'(a) =$ ____.

Answer(s) submitted:

-
-

(incorrect)

13. (1 point) Let a and b be real numbers and let

$$f(x) = \begin{cases} e^{3x} & \text{if} \quad x < 0; \\ \\ ax + b & \text{if} \quad x \geq 0 \end{cases}$$

Given that f is differentiable at the point $x = 0$. Find the values of a and b.
a = ________
b = ________
Answer(s) submitted:

-
-

(incorrect)

14. (1 point) Let

$$f(x) = \begin{cases} \cos x & \text{for } x < 0, \\ 5x + 1 & \text{for } x \geq 0. \end{cases}$$

Which of the following statements is true?

- A. f is continuous at $x = 0$ but not differentiable at $x = 0$.
- B. $\lim_{x \to 0} f(x)$ exists but f is not continuous at $x = 0$.
- C. $\lim_{x \to 0} f(x)$ does not exist.
- D. f is differentiable at $x = 0$.
- E. None of the above.

Answer(s) submitted:

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(incorrect)

15. (1 point)
In this problem we will use a limit to find the instantaneous velocity for position function $f(t) = -16t^2 + 150$ at $t = 1$. As you order the statements below to show that $\lim_{h \to 0} \dfrac{f(1+h) - f(1)}{h} = -32$, focus on why each statement is true.

0. $\lim_{h \to 0} \dfrac{f(1+h) - f(1)}{h}$
1. $= \lim_{h \to 0} \dfrac{\big(-16(1+h)^2 + 150\big) - \big(-16(1)^2 + 150\big)}{h}$
2. $= \lim_{h \to 0} \dfrac{h(-32 - 16h)}{h}$
3. $= -32.$
4. $= \lim_{h \to 0} (-32 - 16h)$

For practice, you should work through the algebra that shows

$$\frac{\big(-16(1+h)^2 + 150\big) - \big(-16(1)^2 + 150\big)}{h} = -32 - 16h$$

whenever $h \neq 0$.
Answer(s) submitted:

- | (incorrect)