Hieu Pham **Brewer_MAT_265_ONLINE_Spring_2014**
Assignment Section_1.5 due 05/01/2014 at 11:58pm MST

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1. (1 pt) Let
$$f(x) = \frac{x^2+1}{1-x^2}.$$
Find each point of discontinuity of f, and for each give the value of the point of discontinuity and evaluate the indicated one-sided limits.

NOTE: When using interval notation in WeBWorK, remember that:
You use 'INF' for ∞ and '-INF' for $-\infty$.
If you have more than one point, give them in numerical order, from smallest to largest.
If you have extra boxes, fill each in with an 'x'.

Point 1: $C =$ _____
$\lim_{x\to C^-} f(x) =$ _____
$\lim_{x\to C^+} f(x) =$ _____

Point 2: $C =$ _____
$\lim_{x\to C^-} f(x) =$ _____
$\lim_{x\to C^+} f(x) =$ _____

Point 3: $C =$ _____
$\lim_{x\to C^-} f(x) =$ _____
$\lim_{x\to C^+} f(x) =$ _____

Answer(s) submitted:

- `-1`
- `-Inf`
- `Inf`
- `1`
- `Inf`
- `-Inf`
- `x`
- `x`
- `x`

(correct)
Correct Answers:

- `-1`
- `-INF`
- `INF`
- `1`
- `INF`
- `-INF`
- `x`
- `x`
- `x`

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2. (1 pt) Let
$$f(x) = \frac{1}{x+2}.$$
Find each point of discontinuity of f, and for each give the value of the point of discontinuity and evaluate the indicated one-sided limits.

NOTE: When using interval notation in WeBWorK, remember that:
You use 'INF' for ∞ and '-INF' for $-\infty$.
If you have more than one point, give them in numerical order, from smallest to largest.
If you have extra boxes, fill each in with an 'x'.

Point 1: $C =$ _____
$\lim_{x\to C^-} f(x) =$ _____
$\lim_{x\to C^+} f(x) =$ _____

Point 2: $C =$ _____
$\lim_{x\to C^-} f(x) =$ _____
$\lim_{x\to C^+} f(x) =$ _____

Point 3: $C =$ _____
$\lim_{x\to C^-} f(x) =$ _____
$\lim_{x\to C^+} f(x) =$ _____

Answer(s) submitted:

- `-2`
- `-Inf`
- `Inf`
- `x`
- `x`
- `x`
- `x`
- `x`
- `x`

(correct)
Correct Answers:

- `-2`
- `-INF`
- `INF`
- `x`
- `x`
- `x`
- `x`
- `x`
- `x`

3. (1 pt)
A function $f(x)$ is said to have a **removable** discontinuity at $x = a$ if:
1. f is either not defined or not continuous at $x = a$.
2. $f(a)$ could either be defined or redefined so that the new function IS continuous at $x = a$.

Let $f(x) = \begin{cases} \frac{8}{x} + \frac{-7x+40}{x(x-5)}, & \text{if } x \neq 0, 5 \\ 5, & \text{if } x = 0 \end{cases}$
Show that $f(x)$ has a removable discontinuity at $x = 0$ and determine what value for $f(0)$ would make $f(x)$ continuous at $x = 0$.
Must redefine $f(0) =$_______.
Hint: Try combining the fractions and simplifying.
The discontinuity at $x = 5$ is actually NOT a removable discontinuity, just in case you were wondering.

Answer(s) submitted:
- -1/5

(correct)
Correct Answers:
- -0.2

4. (1 pt)
A function $f(x)$ is said to have a **jump** discontinuity at $x = a$ if:
1. $\lim_{x \to a^-} f(x)$ exists.
2. $\lim_{x \to a^+} f(x)$ exists.
3. The left and right limits are not equal.

Let $f(x) = \begin{cases} 3x - 7, & \text{if } x < 5 \\ \frac{4}{x+4}, & \text{if } x \geq 5 \end{cases}$
Show that $f(x)$ has a jump discontinuity at $x = 5$ by calculating the limits from the left and right at $x = 5$.
$\lim_{x \to 5^-} f(x) =$_______
$\lim_{x \to 5^+} f(x) =$_______
Now for fun, try to graph $f(x)$.

Answer(s) submitted:
- 8
- 4/9

(correct)
Correct Answers:
- 8
- 0.444444444444444

5. (1 pt) Let
$$f(x) = \begin{cases} 6 + x, & x < -5, \\ 3 - x, & x \geq -5. \end{cases}$$
Find the indicated one-sided limits of f, and determine the continuity of f at the indicated point.
NOTE: Type DNE if a limit does not exist.
You should also sketch a graph of $y = f(x)$, including hollow and solid circles in the appropriate places.
$\lim_{x \to -5^-} f(x) =$ _______________
$\lim_{x \to -5^+} f(x) =$ _______________
$\lim_{x \to -5} f(x) =$ _______________
$f(-5) =$ _______________

Is f continuous at $x = -5$? (YES/NO) ____________

Answer(s) submitted:
- 1
- 8
- DNE
- 8
- NO

(correct)
Correct Answers:
- 1
- 8
- DNE
- 8
- NO

6. (1 pt) Let
$$f(x) = \begin{cases} -6x, & x < 6, \\ 1, & x = 6, \\ 6x, & x > 6. \end{cases}$$
Find the indicated one-sided limits of f, and determine the continuity of f at the indicated point.
NOTE: Type DNE if a limit does not exist.
You should also sketch a graph of $y = f(x)$, including hollow and solid circles in the appropriate places.
$\lim_{x \to 6^-} f(x) =$ _______________
$\lim_{x \to 6^+} f(x) =$ _______________
$\lim_{x \to 6} f(x) =$ _______________
$f(6) =$ _______________

Is f continuous at $x = 6$? (YES/NO) ____________

Answer(s) submitted:
- -36
- 36
- DNE
- 1
- NO

(correct)
Correct Answers:
- -36
- 36
- DNE
- 1
- NO

7. (1 pt) Let

$$f(x) = \frac{x-7}{(x-2)(x+1)}.$$

Use interval notation to indicate where $f(x)$ is continuous.

NOTE: When using interval notation in WeBWorK, remember that:
You use 'INF' for ∞ and '-INF' for $-\infty$.
And use 'U' for the union symbol.

Interval(s) of Continuity:

______

Answer(s) submitted:

- `(-Inf,-1)U(-1,2)U(2,Inf)`

(correct)

Correct Answers:

- `(-infinity,-1) U (-1,2) U (2,infinity)`

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8. (1 pt) Let

$$f(x) = 8x^8 - 5x^4 + 1.$$

Use interval notation to indicate where $f(x)$ is continuous.
Note: Use 'INF' for ∞, '-INF' for $-\infty$, and use 'U' for the union symbol.

Interval(s) of Continuity:

______

Answer(s) submitted:

- `(-Inf,Inf)`

(correct)

Correct Answers:

- `(-infinity,infinity)`

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9. (1 pt) Let

$$f(x) = \sqrt{x-4}.$$

Use interval notation to indicate where $f(x)$ is continuous.

NOTE: Use 'INF' for ∞, '-INF' for $-\infty$ and 'U' for the union symbol.

Interval(s) of Continuity:

______

Answer(s) submitted:

- `[4,Inf)`

(correct)

Correct Answers:

- `[4,infinity)`

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10. (1 pt) Let

$$f(x) = \sqrt[3]{x-3}.$$

Use interval notation to indicate where $f(x)$ is continuous.

NOTE: Use 'INF' for ∞, '-INF' for $-\infty$ and 'U' for the union symbol.

Interval(s) of Continuity:

______

Answer(s) submitted:

- `(-Inf,3]U[3,Inf)`

(correct)

Correct Answers:

- `(-infinity,infinity)`

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11. (1 pt) For what value of the constant c is the function f continuous on $(-\infty,\infty)$ where

$$f(t) = \begin{cases} t^2 - c & \text{if } t \in (-\infty, 3) \\ ct + 2 & \text{if } t \in [3, \infty) \end{cases}$$

$c =$ ______

Answer(s) submitted:

- `7/4`

(correct)

Correct Answers:

- `1.75`

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12. (1 pt)

A function $f(x)$ is said to have a **jump** discontinuity at $x = a$ if:
1. $\lim\limits_{x \to a^-} f(x)$ exists.
2. $\lim\limits_{x \to a^+} f(x)$ exists.
3. The left and right limits are not equal.

Let $f(x) = \begin{cases} x^2 + 3x + 3, & \text{if } x < 5 \\ 6, & \text{if } x = 5 \\ -6x + 4, & \text{if } x > 5 \end{cases}$

Show that $f(x)$ has a jump discontinuity at $x = 5$ by calculating the limits from the left and right at $x = 5$.

$\lim\limits_{x \to 5^-} f(x) =$ ______
$\lim\limits_{x \to 5^+} f(x) =$ ______

Now for fun, try to graph $f(x)$.

Answer(s) submitted:

- `43`
- `-26`

(correct)

Correct Answers:

- `43`
- `-26`

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13. (1 pt) Determine if the Intermediate Value Theorem implies that the equation $x^3 - 3x - 9.9 = 0$ has a root in the interval $(0, 1)$.

The equation above $\boxed{?}$ have a root in that interval.

Answer(s) submitted:

- `does not`

(correct)

Correct Answers:

- `DOES NOT`

14. (1 pt) Let f be a continuous function such that $f(-8)=-1$ and $f(8)=1$.
Using the Intermediate Value Theorem classify the following statements as

(A) Always true
(B) Never True, or
(C) True in some cases; False in others.

1. $f(0)=0$
Answer:(A, B, or C) ___

2. For some c , where $-8 \leq c \leq 8$, $f(c)=0$.
Answer:(A, B, or C) ___

Answer(s) submitted:

- C
- A

(correct)

Correct Answers:

- C
- A