1. (1 pt) Use the **definition of the derivative** (don't be tempted to take shortcuts!) to find the derivative of the function

$$f(x) = 2x + 5\sqrt{x}.$$

Then state the domain of the function and the domain of the derivative.

Note: When entering interval notation in WeBWorK, use **I** for ∞, **-I** for $-\infty$, and **U** for the union symbol. If the set is empty, enter "" without the quotation marks.

$f'(x) =$ ______

Domain of $f(x) =$ ______

Domain of $f'(x) =$ ______

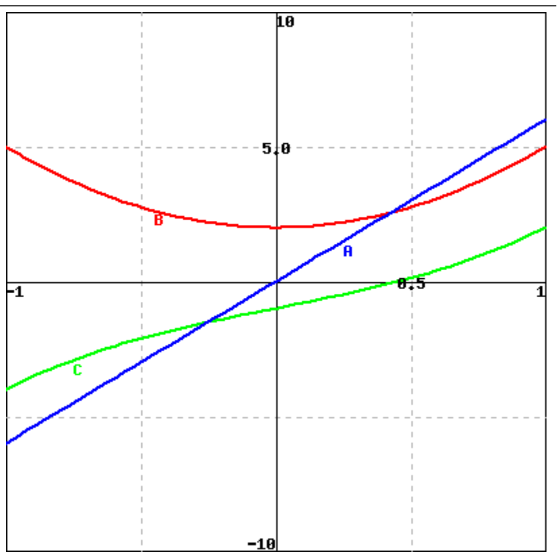
Answer(s) submitted:

- `(5/(2sqrt(x))) + 2`
- `[0,Inf)`
- `(0,Inf)`

(correct)

Correct Answers:

- `2 + (5/2)*x**(-1/2)`
- `[0,infinity)`
- `(0,infinity)`



2. (1 pt)

Identify the graphs A (blue), B(red) and C (green) as the graphs of a function and its derivatives:

___ is the graph of the function
___ is the graph of the function's first derivative
___ is the graph of the function's second derivative

Answer(s) submitted:

- `C`
- `B`
- `A`

(correct)

Correct Answers:

- `C`
- `B`
- `A`

3. (1 pt) Let $f(x) = \frac{3}{x}$.

Then the expression $\frac{f(x+h)-f(x)}{h}$ can be written in the form

$$\frac{A}{x(x+h)},$$

where A is a constant and $A =$ ______

Using your answer from above we have:

$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h} =$ ______

Finally, find each of the following:

$f'(1) =$ ______
$f'(2) =$ ______
$f'(3) =$ ______

Answer(s) submitted:

- `-3`
- `-3/(x^2)`
- `-3`
- `-3/4`
- `-1/3`

(correct)

Correct Answers:

- `-3`
- `-3/(x**2)`
- `-3`
- `-0.75`
- `-0.333333333333333`

4. (1 pt) Let $f(x) = |x-2|$. Evaluate the following limits.

$\lim_{x\to 2^-} \frac{f(x)-f(2)}{x-2} =$ ______

$\lim_{x\to 2^+} \frac{f(x)-f(2)}{x-2} =$ ______

Thus the function $f(x)$ is not differentiable at 2.

Answer(s) submitted:

- `-1`
- `+1`

(correct)

Correct Answers:

- -1
- 1

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5. (1 pt) Let

$$f(x) = \begin{cases} x^2+3, & x<0, \\ 3, & x \geq 0. \end{cases}$$

(A) Sketch the graph of f, and when you're done, place a "1" in the box: ___

(B) Find the value of x where f is discontinuous. If there is no value, enter 'NONE'.

x-values = __________

(C) Find the value of x where f is nondifferentiable. If there is no value, enter 'NONE'.

x-values = __________

Answer(s) submitted:

- 1
- NONE
- NONE

(correct)

Correct Answers:

- 1
- NONE
- NONE

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6. (1 pt) Enter a T or an F in each answer space below to indicate whether the corresponding statement is true or false. A statement is true only if it is true for all possibilities. You must get all of the answers correct to receive credit.

___1. $\lim_{x\to 3} \frac{x^2+3x-17}{x^2+6x-25} = \frac{\lim_{x\to 3} x^2+3x-17}{\lim_{x\to 3} x^2+6x-25}$

___2. If $\lim_{x\to 4} f(x) = 0$ and $\lim_{x\to 4} g(x) = 0$, then $\lim_{x\to 4}[f(x)/g(x)]$ does not exist

___3. If $f(x)$ is differentiable at a, then $f(x)$ is continuous at a

___4. If $\lim_{x\to 4} f(x) = 3$ and $\lim_{x\to 4} g(x) = 0$, then $\lim_{x\to 4}[f(x)/g(x)]$ does not exist

___5. If $f'(3)$ exists, then then the limit $\lim_{x\to 3} f(x)$ is $f(3)$

Answer(s) submitted:

- T
- F
- T
- T
- T

(correct)

Correct Answers:

- T
- F
- T
- T
- T