Matthew Boelkins **MTH201-10**

Assignment 09.17.15.T1Review due 09/22/2015 at 11:59pm EDT

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1. (0 pts) The point $P(4,6)$ lies on the curve $y = \sqrt{x} + 4$. If Q is the point $(x, \sqrt{x} + 4)$, find the slope of the secant line PQ for the following values of x.
If $x = 4.1$, the slope of PQ is: ____________
and if $x = 4.01$, the slope of PQ is: ____________
and if $x = 3.9$, the slope of PQ is: ____________
and if $x = 3.99$, the slope of PQ is: ____________
Based on the above results, guess the slope of the tangent line to the curve at $P(4,6)$. ____________

Answer(s) submitted:

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(incorrect)

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2. (0 pts) The point $P(5,1)$ lies on the curve $y = \frac{5}{x}$. If Q is the point $(x, \frac{5}{x})$, find the slope of the secant line PQ for the following values of x.
If $x = 5.1$, the slope of PQ is: ____________
and if $x = 5.01$, the slope of PQ is: ____________
and if $x = 4.9$, the slope of PQ is: ____________
and if $x = 4.99$, the slope of PQ is: ____________
Based on the above results, guess the slope of the tangent line to the curve at $P(5,1)$. ____________

Answer(s) submitted:

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(incorrect)

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3. (0 pts) If a ball is thrown straight up into the air with an initial velocity of 70 ft/s, its height in feet after t seconds is given by $y = 70t - 16t^2$. Find the average velocity for the time period beginning when $t = 2$ and lasting
(i) 0.5 seconds ________________

(ii) 0.1 seconds ________________

(iii) 0.01 seconds ________________

Finally, based on the above results, guess what the instantaneous velocity of the ball is when $t = 2$. __________

Answer(s) submitted:

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(incorrect)

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4. (0 pts) The displacement (in feet) of a certain particle moving in a straight line is given by $y = \frac{t^3}{5}$.

(A) Find the average velocity for the time period beginning when $t = 3$ and lasting
(i) .01 s:______________
(ii) .005 s:______________
(iii).002 s:______________
(iv) .001 s:______________
NOTE: For the above answers, you may have to enter 6 or 7 significant digits if you are using a calculator.
(B) Estimate the instantaneous velocity when $t = 3$.

_____

Answer(s) submitted:

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(incorrect)

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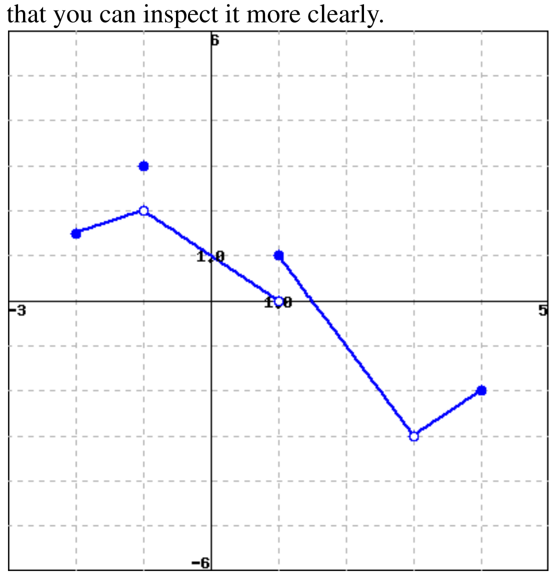
5. (0 pts) Let F be the function below.

If you are having a hard time seeing the picture clearly, click on the picture. It will expand to a larger picture on its own page so that you can inspect it more clearly.



Evaluate each of the following expressions.

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

a) $\lim_{x \to -1^-} F(x) =$ ___

b) $\lim_{x \to -1^+} F(x) =$ ___

c) $\lim_{x \to -1} F(x) =$ ___

d) $F(-1) =$ ___

e) $\lim_{x \to 1^-} F(x) =$ ___

f) $\lim_{x \to 1^+} F(x) =$ ___

g) $\lim_{x \to 1} F(x) =$ ___

h) $\lim_{x \to 3} F(x) =$ ___

i) $F(3) =$ ___

Answer(s) submitted:

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(incorrect)

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6. (0 pts) Let

$$f(x) = \begin{cases} 2, & x < 2, \\ 4x, & x = 2, \\ 10 + x, & x > 2. \end{cases}$$

Evaluate each of the following:

Note: You use **I** for ∞ and **-I** for $-\infty$.

(A) $\lim_{x \to 2^-} f(x) =$ _____

(B) $\lim_{x \to 2^+} f(x) =$ _____

(C) $f(2) =$ _____

Answer(s) submitted:

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(incorrect)

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7. (0 pts) Evaluate the limit

$$\lim_{x \to 5} \frac{x^2 - 6x + 5}{x^2 - 9x + 20}$$

Enter **I** for ∞, **-I** for $-\infty$, and **DNE** if the limit does not exist.

Limit = ____________

Answer(s) submitted:

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(incorrect)

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8. (0 pts) Evaluate

$$\lim_{h \to 0} \frac{f(4+h) - f(4)}{h},$$

where $f(x) = 4x^2 + 4$. Enter **I** for ∞, **-I** for $-\infty$, and **DNE** if the limit does not exist.

Limit = ____________

Answer(s) submitted:

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(incorrect)

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9. (0 pts) Find (in terms of the constant a)

$$\lim_{h \to 0} \frac{\frac{3}{a+h} - \frac{3}{a}}{h}.$$

Limit = __________

Answer(s) submitted:

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(incorrect)

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10. (0 pts) Find (in terms of the constant a)

$$\lim_{h \to 0} \frac{8(a+h)^2 - 8a^2}{h}.$$

Limit = __________

Answer(s) submitted:

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(incorrect)

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11. (0 pts) Evaluate the limit

$$\lim_{x \to 3} \frac{|x-3|}{x-3}$$

Enter **I** for ∞, **-I** for $-\infty$, and **DNE** if the limit does not exist.

Limit = ____________

Answer(s) submitted:

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(incorrect)

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12. (0 pts) Find an equation of the line tangent to the graph of

$$y = \frac{7}{x^4}$$

at the point (5, 7/625).

Answer: $y =$ __________

Answer(s) submitted:

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(incorrect)

13. (0 pts) The displacement (in meters) of a particle moving in a straight line is given by

$$s = t^2 - 9t + 13,$$

where t is measured in seconds.

(A)

(i) Find the average velocity over the time interval [3,4].
Average Velocity = ________
(ii) Find the average velocity over the time interval [3.5,4].
Average Velocity = ________
(iii) Find the average velocity over the time interval [4,5].
Average Velocity = ________
(iv) Find the average velocity over the time interval [4,4.5].
Average Velocity = ________

(B) Find the instantaneous velocity when $t = 4$.
Instantaneous velocity = ________

Answer(s) submitted:

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(incorrect)

14. (0 pts) If the tangent line to $y = f(x)$ at $(-2,3)$ passes through the point $(8,-3)$, find $f(-2)$ and $f'(-2)$.

$f(-2)$ = ________
$f'(-2)$ = ________

Answer(s) submitted:

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(incorrect)

15. (0 pts) Find $f'(a)$ for

$$f(x) = 8 + 3x - 6x^2.$$

$f'(a)$ = ________

Answer(s) submitted:

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(incorrect)

16. (0 pts) Find $f'(a)$ for

$$f(x) = 5x^3 + 4x.$$

$f'(a)$ = ________

Answer(s) submitted:

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(incorrect)

17. (0 pts) The limit

$$\lim_{h \to 0} \frac{\sqrt{49+h} - 7}{h}$$

represents the derivative of some function $f(x)$ at some number a. Find f and a.

$f(x)$ = ________

a = ________

Answer(s) submitted:

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(incorrect)

18. (0 pts) Use the **definition of the derivative** (don't be tempted to take shortcuts!) to find the derivative of the function

$$f(x) = 2 - 4x + 9x^2.$$

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:

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(incorrect)

19. (0 pts) Let $g(x) = -2 + 7x + 5x^2$. Then the expression

$$\frac{g(x+h) - g(x)}{h}$$

can be written in the form $Ah + Bx + C$, where A, B, and C are constants. (Note: It's possible for one or more of these constants to be 0.)
(A) Find the constants.

$A =$ ___
$B =$ ___
$C =$ ___

Answer(s) submitted:

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(incorrect)

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20. (0 pts) Use the **definition of the derivative** (don't be tempted to take shortcuts!) to find the derivative of the function

$$f(x) = \frac{9}{8x^2}.$$

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:

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(incorrect)

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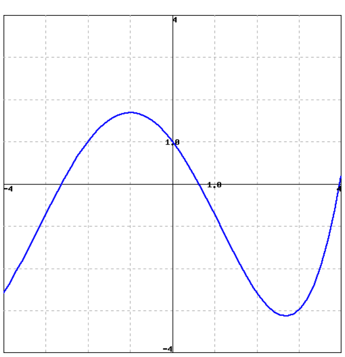
21. (0 pts) Consider the function $f(x)$ shown in the graph below.



(Note that you can click on the graph to get a larger version of it, and that it may be useful to print that larger version to be able to work with it by hand.)

Carefully sketch the derivative function of the given function (you will want to estimate values on the derivative function at different x values as you do this). Use your derivative function graph to estimate the following values on the derivative function.

at $x =$	-3	-1	1	3
the derivative is	___	___	___	___

Answer(s) submitted:

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(incorrect)

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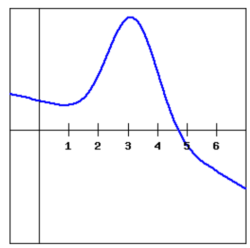
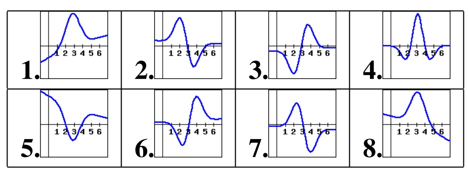
22. (0 pts) For the function $f(x)$ shown in the graph below, sketch a graph of the derivative. You will then be picking which of the following is the correct derivative graph, but should be sure to first sketch the derivative yourself.



Which of the following graphs is the derivative of $f(x)$? [?]
(Click on a graph to enlarge it.)



Answer(s) submitted:

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(incorrect)

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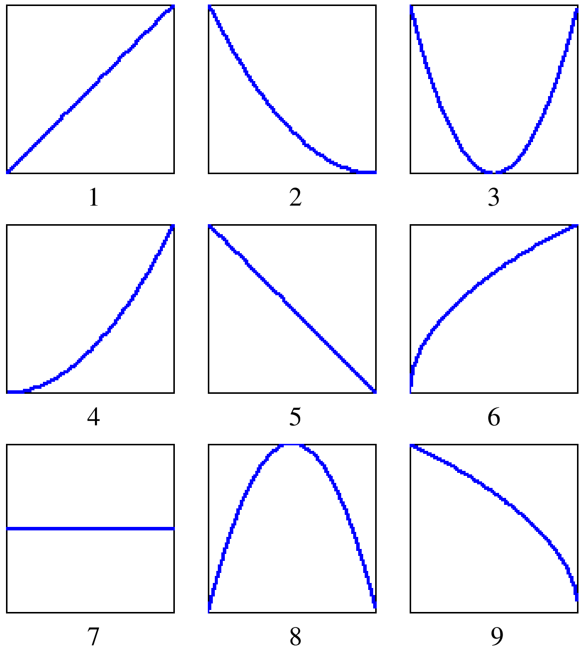
23. (0 pts) On a piece of paper, draw the graph of a continuous function $y = f(x)$ that satisfies the following three conditions.

$$f'(x) = 0 \quad \text{for} \quad x < -4,$$
$$f'(x) < 0 \quad \text{for} \quad -4 < x < 4,$$
$$f'(x) > 0 \quad \text{for} \quad 4 < x$$

Approximate your function by picking a segment from the following for each of the sections of your graph, first for $x < -4$, then for $-4 < x, 4$, and then for $4 < x$. (You should, of course, imagine sliding the pieces vertically up or down to make the function you create be continuous.)

For $x < -4$, use segment ___
For $-4 < x < 4$, use segment ___
For $4 < x$, use segment ___



Answer(s) submitted:

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(incorrect)