

MATH 161 – FALL 2009 – SECOND EXAM – OCTOBER 20, 2009
TEST NUMBER 01

STUDENT NAME _____

STUDENT ID _____

LECTURE TIME _____

RECITATION INSTRUCTOR _____

RECITATION TIME _____

INSTRUCTIONS

1. Fill in all the information requested above and the version number of the test on your scantron sheet.
2. This booklet contains 12 problems, each worth 8 points. There are four free points. The maximum score is 100 points.
3. For each problem mark your answer on the scantron sheet and also circle it in this booklet.
4. Work only on the pages of this booklet.
5. Books, notes, calculators are not to be used on this test.
6. At the end turn in your exam and scantron sheet to your recitation instructor.

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1) The graphs shown below are graphs of a function f , its first derivative f' , and its second derivative f'' . Determine the appropriate labels for the graph of f , f' and f'' , in that order.

A) a, b, c

B) a, c, b

C) b, c, a

D) b, a, c

E) c, b, a

2) The derivative of $2\sqrt{t} - \frac{6}{\sqrt{t}}$ is

A) $\frac{1}{\sqrt{t}} + \frac{3}{t^{3/2}}$

B) $\frac{2}{\sqrt{t}} + \frac{3}{t^{3/4}}$

C) $2t^{3/2} - 6t^{2/3}$

D) $\frac{4}{3}t^{3/2} - 9t^{1/3}$

E) $t^{3/2} + 2t^{2/3}$

3) At what values of x does the curve $y = \frac{1}{3}x^3 + \frac{5}{2}x^2 - 14x + 1$ have a horizontal tangent?

A) $x = \frac{-5 \pm \sqrt{97}}{2}$

B) $x = \pm \sqrt{\frac{54}{3}}$

C) $x = 7$ and $x = 2$

D) $x = 2$ and $x = -7$

E) $x = 2$ and $x = 3$

4) If $f(x)$ is a differentiable function, compute the derivative of $\frac{4+x^2f(x)}{x^3}$.

A) $\frac{x^3f'(x)+5x^2f(x)+12}{x^4}$

B) $\frac{x^3f'(x)-x^2f(x)-12}{x^4}$

C) $\frac{-x^2f'(x)+(3x^2-2x)f(x)+12}{x^4}$

D) $\frac{2x^5f'(x)-3x^2f(x)-12}{x^4}$

E) $\frac{2f'(x)}{3x^2}$

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5) An equation for the tangent line to $y = e^x(x^2 + 5)$ at $x = 1$ is

A) $y = 2ex + 4e$

B) $y = 3ex + 3e$

C) $y = 4ex + 4e$

D) $y = 8ex - 2e$

E) $y = 10ex - 6e$

6) If $y = (\tan x)(\sec x)$, then $\frac{dy}{dx}$ at $\pi/3$ is

A) $8\sqrt{3}$

B) $\frac{19}{6\sqrt{3}}$

C) 14

D) $\frac{8}{3}$

E) 11

7) Evaluate the limit

$$\lim_{t \rightarrow 0} \frac{\tan 4t}{t}.$$

A) 4

B) 1

C) 2

D) 0

E) The limit does not exist

8) The derivative of $f(x) = 2^{(x^2+3x+2)}$ at $x = 0$ is equal to

A) $24 \ln 2$

B) $10 \ln 2$

C) 10

D) $13e$

E) $12 \ln 2$

9) Suppose that C is the curve defined by $2y^2 - xy^3 - x + 2 = 0$. Find an equation of the tangent line of C at the point $(2, 1)$.

A) $y = 2x - 3$

B) $y = x/2$

C) $y = -2x + 5$

D) $y = 3 - x$

E) $y = \frac{1}{2}x + 2$

10) Let $f(x)$ be differentiable at 2 and let g be differentiable at 1. Suppose that $f(2) = 4$, $f'(2) = -1$, $g(1) = 2$ and $g'(1) = -3$. Let $h(x) = (f[(g(x))])^2$. Compute $h'(1)$.

A) $h'(1) = 36$

B) $h'(1) = 24$

C) $h'(1) = -12$

D) $h'(1) = 12$

E) $h'(1) = -48$.

11) Let $f(x) = \arctan(x^2 + 1)$ Then $f'(1)$ is equal to

A) π

B) $2/3$

C) $2/5$

D) $1/4$

E) 3

12) Find the derivative of $f(x) = x^{(\ln x)}$ at e .

A) $f'(e) = 3e$

B) $f'(1) = 2e + 1$

C) $f'(e) = 1/4$

D) $f'(e) = -1/3$

E) $f'(e) = 2$