Name: _____

Instructor: _____

Math 10550, Exam I
September 24, 2013

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- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 9 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(d)	(e)
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7.	(a)	(b)	(c)	(d)	(e)
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9.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)

Please do NOT write in this box.

Multiple Choice_____

11. _____

12. _____

13. _____

Total _____

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Multiple Choice

1.(6 pts.) Compute

$$\lim_{x \to -1^-} \frac{x^2 - 1}{x^2 + 2x + 1}.$$

(a) 0

(b) 1

(c) ∞

(d) Does not exist and is not $+\infty$ or $-\infty$

(e) $-\infty$

2.(6 pts.) The function $f(x) = \dfrac{x^2 - 1}{x^3 - 9x}$ has vertical asymptotes *exactly* at

(a) $x = \pm 1$

(b) 0

(c) $x = 0$, $x = \pm 1$ and $x = \pm 3$

(d) $x = 0$ and $x = \pm 3$

(e) $x = 0$ and $x = \pm 1$

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3.(6 pts.) For what value a is the function f given by

$$f(x) = \begin{cases} \dfrac{\sqrt{9+x^2}-3}{x^2} & x \neq 0 \\ a & x = 0 \end{cases}$$

(a) $\dfrac{1}{6}$

(b) No value of a makes f continuous everywhere

(c) 1

(d) any value of a

(e) $\dfrac{1}{3}$

4.(6 pts.) Find $f'(2)$ if

$$f(x) = 4\sqrt{x+2} - \frac{16}{\sqrt{x+2}}.$$

(a) 0 (b) 2 (c) 3 (d) 4 (e) -1

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5.(6 pts.) Find the equation of the tangent line to the curve $y = 6\sqrt{x} + 2$ at $x = 9$.

(a) $y = 2x + 2$ (b) $y = x + 9$ (c) $y = -x + 29$

(d) $y = 3x - 7$ (e) $y = x + 11$

6.(6 pts.) Find the derivative of $f(x) = (3 + x^3)^{2/3}$.

(a) $2x^3(3 + x^3)^{-1/3}$ (b) $2x^2(3 + x^3)^{-1/3}$

(c) $\frac{2}{3}x^2(3 + x^3)^{-1/3}$ (d) $\frac{2}{3}(3 + x^2)(3 + x^3)^{-1/3}$

(e) $\frac{2}{3}(3 + x^3)^{-1/3}$

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7.(6 pts.) Compute the derivative of

$$f(x) = \frac{x^2 + \cos x}{x + \cos^2 x}.$$

(a) $\dfrac{(2x - \sin x)(x + \cos^2 x) - (1 + 2\cos x)(x^2 + \cos x)}{(x + \cos^2 x)^2}$

(b) $\dfrac{(2x - \sin x)(x + \cos^2 x) - (1 - 2\cos x)(x^2 + \cos x)}{(x + \cos^2 x)^2}$

(c) $\dfrac{2x - \sin x}{1 - 2\sin x \cos x}$

(d) $\dfrac{(2x + \sin x)(x + \cos^2 x) - (1 + 2\sin x \cos x)(x^2 + \cos x)}{(x + \cos^2 x)^2}$

(e) $\dfrac{(2x - \sin x)(x + \cos^2 x) - (1 - 2\sin x \cos x)(x^2 + \cos x)}{(x + \cos^2 x)^2}$

8.(6 pts.) If $f(x) = \cos(x^2)$, find $f''(x)$.

(a) $f''(x) = 2\sin(x^2) - 4x^2\cos(x^2)$

(b) $f''(x) = -2\sin(x^2) + 4x^2\cos(x^2)$

(c) $f''(x) = 2\sin(x^2) + 4x^2\cos(x^2)$

(d) $f''(x) = -2\sin(x^2) - 4x^2\cos(x^2)$

(e) $f''(x) = -\cos(x^2)$

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9.(6 pts.) Compute

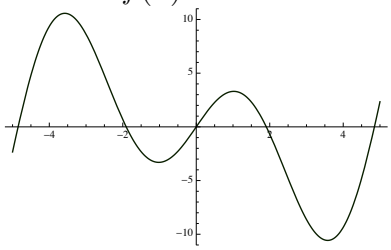
$$\lim_{x\to 0} \frac{\sin(4x)}{\tan(9x)}.$$

(a) $\frac{9}{4}$ (b) 1

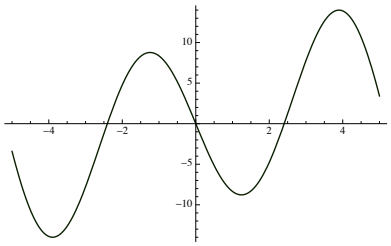
(c) $\frac{4}{9}$ (d) 0

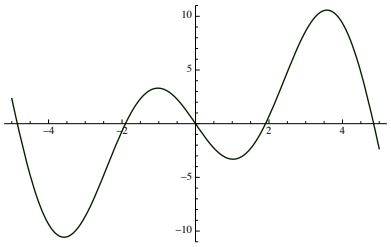
(e) Does not exist.

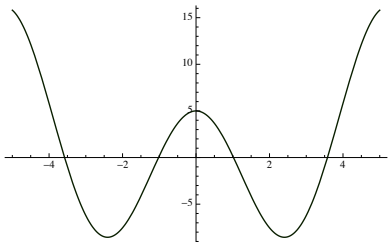
10.(6 pts.) The graph of the function $f(x)$ is shown below:

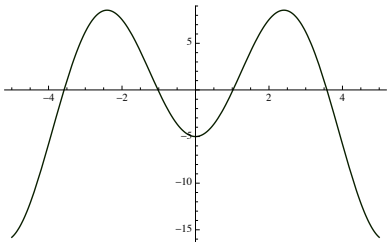


Which of the following gives the graph of $f'(x)$?

(a)


(b)


(c)


(d)


(e) None of the above

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Partial Credit

You must show your work on the partial credit problems to receive credit!

11.(13 pts.) Show that there are at least two solutions of the equation

$$x^4 = 6x - 1.$$

Be sure to check the hypotheses of any theorem you might use.

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12.(13 pts.) Find the derivative of

$$y = \frac{1}{\sqrt{x}+1}$$

using the definition of the derivative.

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13.(14 pts.) At what point(s) on the ellipse $3x^2 + y^2 = 21$ is the tangent line at that point parallel to the straight line $y = -2x + 6$?

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