

Name: _____

Instructor: _____

Math 10550, Practice Exam I
February 11, 3026

- The Honor Code is in effect for this examination. All work is to be your own.
- 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 12 pages of the test.
- Each multiple choice question is worth 7 points. Your score will be the sum of the best 10 scores on the multiple choice questions plus your score on questions 13-15.

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)
6.	(a)	(b)	(c)	(d)	(e)
.....					
7.	(a)	(b)	(c)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(e)
.....					
9.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)
.....					
11.	(a)	(b)	(c)	(d)	(e)
12.	(a)	(b)	(c)	(d)	(e)

Please do NOT write in this box.

Multiple Choice _____

13. _____

14. _____

15. _____

Total _____

Name: _____

Instructor: _____

Multiple Choice

1.(7 pts.) Compute

$$\lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 21} - 5}{x - 2}.$$

- (a) $\frac{2}{5}$ (b) 0 (c) $\frac{1}{10}$ (d) $\frac{1}{120}$ (e) 4

2.(7 pts.) Alejandro runs a 40 meter dash. After t seconds of running, he is located $\frac{1}{3}t^3 + 4t$ meters away from the starting line. What is his average velocity over the time interval from $t = 2$ to $t = 3$ seconds? All answers are given in meters per second.

- (a) $31\frac{2}{3}$ (i.e., $\frac{95}{3}$) (b) $2\frac{1}{15}$ (i.e., $\frac{31}{15}$)
(c) $10\frac{1}{3}$ (i.e., $\frac{31}{3}$) (d) $1\frac{1}{2}$ (i.e., $\frac{3}{2}$)
(e) $26\frac{1}{3}$ (i.e., $\frac{79}{3}$)

Name: _____

Instructor: _____

3.(7 pts.) Compute $\lim_{x \rightarrow -1^-} \frac{x^2 + x}{x^2 + 2x + 1}$

(a) $-\infty$

(b) -1

(c) 0

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

(e) $+\infty$

4.(7 pts.) Let $f(x) = \sqrt{2x^2 + 1}$. Which of the following limits equals $f'(2)$?

(a) $\lim_{h \rightarrow 2} \frac{\sqrt{2(x+h)^2 + 1} - \sqrt{2x^2 + 1}}{h}$

(b) $\lim_{x \rightarrow 2} \frac{\sqrt{2x^2 + 1} - 3}{x - 2}$

(c) $\lim_{x \rightarrow 0} \frac{\sqrt{2x^2 + 1} - 3}{x}$

(d) $\lim_{h \rightarrow 0} \frac{\sqrt{2(x+h)^2 + 1} - \sqrt{2x^2 + 1}}{h}$

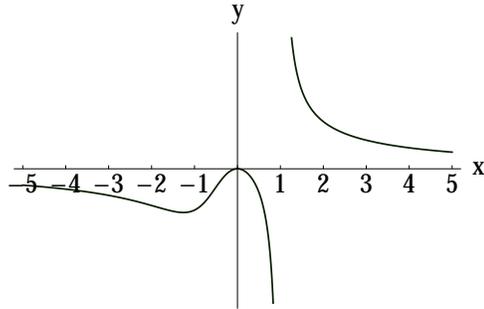
(e) $\lim_{h \rightarrow 2} \frac{\sqrt{2(x+h)^2 + 1} - 3}{h}$

Name: _____

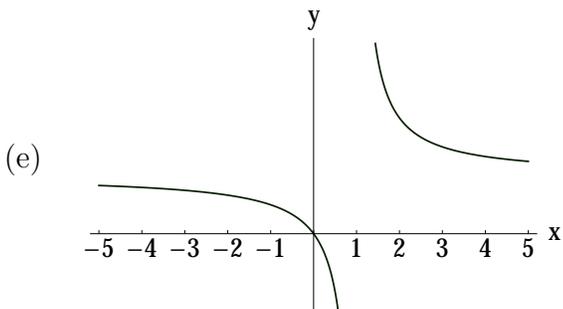
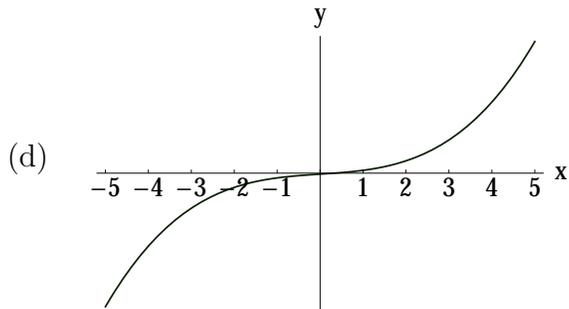
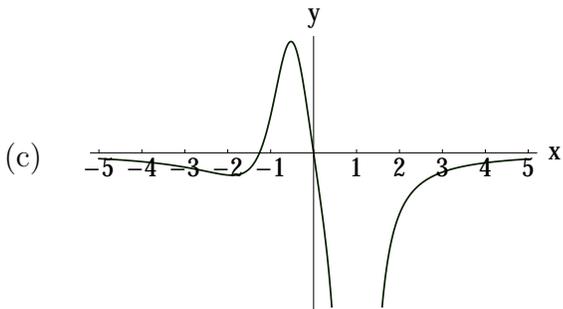
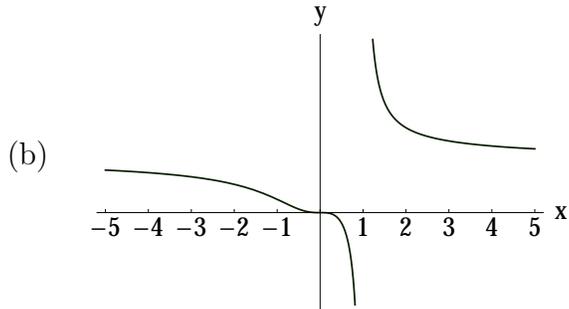
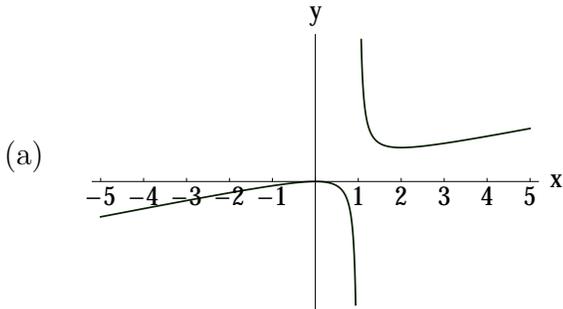
Instructor: _____

5. (7 pts.)

The graph of $f(x)$ is shown below:



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



Name: _____

Instructor: _____

6.(7 pts.) Evaluate: $\lim_{h \rightarrow 0} \frac{(1+h)^2 + 2(1+h) - 3}{h}$

(a) 1

(b) 2

(c) 0

(d) 4

(e) The limit does not exist (DNE)

Name: _____

Instructor: _____

7.(7 pts.) For what values of c is the function f given by

$$f(x) = \begin{cases} x^2 + c^2x - 3 & x < 2 \\ cx + 5 & x \geq 2 \end{cases}$$

continuous at $x = 2$?

- (a) No value of c makes f continuous at $x = 2$
- (b) $c = 2$ only
- (c) $c = 1$ only
- (d) $c = 0$ only
- (e) $c = 2$ and $c = -1$

8.(7 pts.) For what value(s) of a and b is $f(x)$ continuous and differentiable at $x = 1$?

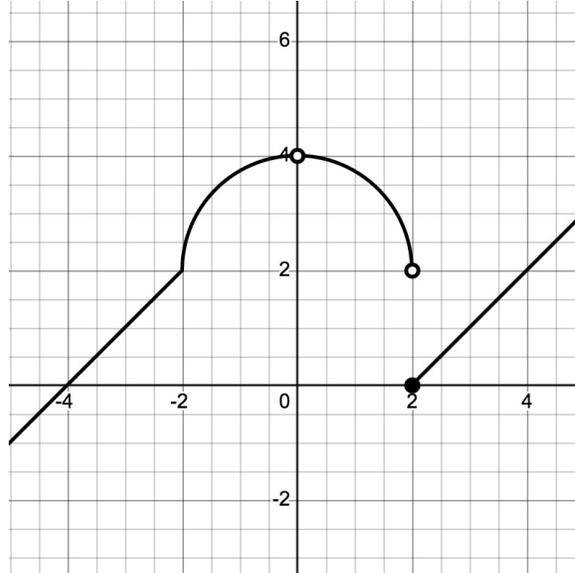
$$f(x) = \begin{cases} x^2 + ax + 2 & \text{if } x < 1 \\ bx^2 - 1 & \text{if } x \geq 1 \end{cases}$$

- (a) $a = -1, b = -4$
- (b) $a = -6, b = -2$
- (c) $a = -4, b = -1$
- (d) $a = -1, b = 3$
- (e) $a = 0, b = 4$

Name: _____

Instructor: _____

9.(7 pts.) The graph of $f(x)$ is shown. Which of the following statements is true?



- (a) $f'(-2) = 1$
- (b) $f'(0) = 0$
- (c) $f(x)$ is continuous from the right at $x = 2$.
- (d) $\lim_{x \rightarrow 0} f(x)$ does not exist
- (e) $f(x)$ has a removable discontinuity at $x = 2$.

10.(7 pts.) Evaluate $\lim_{x \rightarrow -\infty} \frac{3x^3 - 2x + 1}{2x^2 + x + 1}$

- (a) $\frac{3}{2}$
- (b) 0
- (c) $-\frac{3}{2}$
- (d) $-\infty$
- (e) Does not exist

Name: _____

Instructor: _____

11.(7 pts.) Evaluate $\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^6 + 5}}{x^3 + 1}$.

- (a) $3/2$ (b) 6 (c) -2 (d) 4 (e) 2

12.(7 pts.) If $f(x) = x^3 - 3x^2 - 9x + 7$, find the x -coordinates of all points on the curve with horizontal tangent line.

- (a) $x = 0$ and $x = 1$
(b) $x = 3$ and $x = -1$
(c) $x = 4$ and $x = -2$
(d) $x = -3$ and $x = 1$
(e) No points on the curve have horizontal tangent line.

Name: _____

Instructor: _____

Partial Credit

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

13.(13 pts.) Find the derivative of

$$f(x) = \sqrt{x+1}$$

using the limit definition of the derivative.

Please include all of the details in your calculation.

Name: _____

Instructor: _____

14.(13 pts.) Show that there is at least one solution of the equation

$$x^2 = 2 + \sin(\pi x).$$

Justify your answer, identify the theorem you use and explain why the theorem applies.

Name: _____

Instructor: _____

15.(4 pts.) Please circle “TRUE” if you think the statement is true, and circle “FALSE” if you think the statement is False.

(a)(1 pt. No Partial credit.) $\lim_{x \rightarrow 0^+} \ln(x) = 1.$

TRUE FALSE

(b)(1 pt. No Partial credit) If the function $f(x)$ is continuous at $x = a$, then it must be differentiable at $x = a$

TRUE FALSE

(c)(1 pt. No Partial credit.)

If $f(x) = 4x^3 + 2x^2 + x + 1$, then $f''(1) = 30.$

TRUE FALSE

(d)(1 pt. No Partial credit) $\frac{\pi}{2}$ is in the domain of the function $f(x) = \tan(x).$

TRUE FALSE

Name: _____

Instructor: _____

Rough Work

Name: _____

Instructor: ANSWERS

Math 10550, Practice Exam I
February 11, 3026

- The Honor Code is in effect for this examination. All work is to be your own.
- 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 12 pages of the test.
- Each multiple choice question is worth 7 points. Your score will be the sum of the best 10 scores on the multiple choice questions plus your score on questions 13-15.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!					
1.	(●)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(●)	(d)	(e)
.....					
3.	(a)	(b)	(c)	(d)	(●)
4.	(a)	(●)	(c)	(d)	(e)
.....					
5.	(a)	(b)	(●)	(d)	(e)
6.	(a)	(b)	(c)	(●)	(e)
.....					
7.	(a)	(b)	(c)	(d)	(●)
8.	(a)	(●)	(c)	(d)	(e)
.....					
9.	(a)	(b)	(●)	(d)	(e)
10.	(a)	(b)	(c)	(●)	(e)
.....					
11.	(a)	(b)	(●)	(d)	(e)
12.	(a)	(●)	(c)	(d)	(e)

Please do NOT write in this box.

Multiple Choice _____

13. _____

14. _____

15. _____

Total _____