

Name: _____

Instructor: _____

Math 10550, EXAM II
October 13, 3016

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hr. and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 11 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.(6 pts.) Find y' , if

$$x^4 + x^3y + 5xy^2 = 8.$$

(a) $\frac{-(4x^3 + 3x^2y + 5y^2)}{10xy}$

(b) $\frac{-(4x^3 + 3x^2y + 5y^2)}{x^3}$

(c) $\frac{-(4x^3 + 3x^2y)}{x^3 + 10xy}$

(d) The derivative does not exist.

(e) $\frac{-(4x^3 + 3x^2y + 5y^2)}{x^3 + 10xy}$

2.(6 pts.) If $\sin(\pi xy) = \pi(x + y)$ find $\frac{dy}{dx}$ at $(1, -1)$ by implicit differentiation.

(a) $\frac{\pi}{2}$

(b) 0

(c) 1

(d) -1

(e) π

Name: _____

Instructor: _____

3.(6 pts.) A particle is moving in a straight line along a horizontal axis with a position function given by

$$s(t) = t^2 - 4t + 4,$$

where distance is measured in feet and time is measured in seconds. What is the distance travelled by the particle in the time period $1 \leq t \leq 4$ seconds?

- (a) 5 feet (b) 8 feet (c) 3 feet
(d) 0 feet (e) 2 feet

4.(6 pts.) A beetle travels in straight line with position $s(t)$ (measured in feet) at time t (measured in seconds), $t \geq 0$. $s(t)$ is given by

$$s(t) = 3t^4 - 20t^3 + 36t^2.$$

At what time, after the motion gets started, does the beetle first come to rest?

- (a) $t = 1$ (b) $t = 3$ (c) $t = 2$
(d) This beetle never stops (e) $t = 4$

Name: _____

Instructor: _____

5.(6 pts.) A right triangle has base x feet and height y feet. If the base increases at 2 ft/second, and the height increases at 1 ft/second, find the rate of change in the area of the right triangle when $x = 8$ and $y = 5$.

- (a) $2 \text{ ft}^2/\text{second}$ (b) $10.5 \text{ ft}^2/\text{second}$ (c) $18 \text{ ft}^2/\text{second}$
(d) $-1 \text{ ft}^2/\text{second}$ (e) $9 \text{ ft}^2/\text{second}$

6.(6 pts.) Suppose f is differentiable and $-2 \leq f'(x) \leq 1$ for all x and $f(2) = 3$. What are the minimum and maximum possible values for $f(5)$?

- (a) $-3 \leq f(5) \leq 0$ (b) $-3 \leq f(5) \leq 6$ (c) $3 \leq f(5) \leq 6$
(d) $-5 \leq f(5) \leq 4$ (e) $-10 \leq f(5) \leq 10$

Name: _____

Instructor: _____

7.(6 pts.) Use linear approximation of $f(x) = \sqrt[3]{x}$ at $a = -8$ to estimate $\sqrt[3]{-8.12}$.

- (a) -1.99 (b) -2.04 (c) -2.01 (d) -1.8 (e) -2.2

8.(6 pts.) Find the linearization of the function $f(x) = \sin^2(x)$ at $a = \frac{\pi}{4}$.

- (a) $x + \frac{1}{\sqrt{2}} - \frac{\pi}{4}$ (b) $\frac{x}{2} + \frac{1}{2} - \frac{\pi}{4}$ (c) $-\frac{10}{4}x - \frac{1}{4}$
(d) $\frac{1}{2}x + \frac{3}{2}$ (e) $x + \frac{1}{2} - \frac{\pi}{4}$

Name: _____

Instructor: _____

9.(6 pts.) Which of the following gives a complete list of the critical numbers/points of the function

$$f(x) = 3x^{2/3} \cdot (x + 1)^3$$

(a) $x = \frac{-2}{11}, -1$

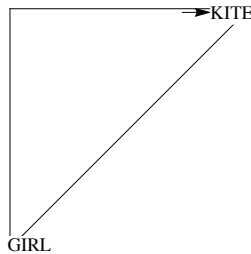
(b) $x = \frac{2}{11}, -1$

(c) $x = 0, \frac{-2}{11}, -1$

(d) $x = \frac{2}{11}, 1$

(e) $x = -1, 0$

10.(6 pts.) A girl flies a kite at a height of 4 meters, the wind is carrying the kite horizontally away from her at a rate of 2 m/sec (there is no vertical movement in the kite). How fast must she let out the string when the kite is 5 meters away from her?



(a) $\frac{6}{5}$ m/sec

(b) $\frac{10}{3}$ m/sec

(c) $10\sqrt{3}$ m/sec

(d) 3 m/sec

(e) 5 m/sec

Name: _____

Instructor: _____

11.(6 pts.) Let $f(x) = 4x^2 - 4x + 4$. Find the absolute maximum and absolute minimum of f on the interval $[0, 2]$. (That is find the maximum and minimum value of $f(x)$ on the given interval).

- (a) Max value = 6, Min value = 4
- (b) Max value = 12, Min value = 3
- (c) Max value = 4, Min value = 3
- (d) Max value = 12, No Minimum value exists
- (e) Max value = 12, Min value = 4

12.(6 pts.) Consider the function $f(x) = x^4 - 8x^3 + 5$. Which of the following statements is true?

- (a) f has a local minimum at $x = 6$, a local maximum at $x = 0$, and points of inflection at $x = 0$ and 4 .
- (b) f has a local minimum at $x = 6$, no local maximum, and points of inflection at $x = 0, 4$ and -4 .
- (c) f has local minima at $x = 0$ and 6 , no local maximum, and a point of inflection at $x = 4$.
- (d) f has a local minimum at $x = 6$, no local maximum, and points of inflection at $x = 0$ and 4 .
- (e) f has a local maximum at $x = 0$, no local minimum, and a point of inflection at $x = 4$.

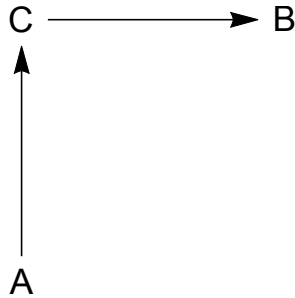
Name: _____

Instructor: _____

Partial Credit

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

13.(10 pts.) Pedestrian A is walking towards the intersection C of two streets intersecting at a right angle. Pedestrian B is walking away from intersection C . Pedestrian A is going North at 2 mph, and Pedestrian B is going East at 3 mph. How fast is the distance from Pedestrian A to Pedestrian B changing when Pedestrian A is 4 miles South of intersection C , and Pedestrian B is 3 miles East of intersection C .



Name: _____

Instructor: _____

14.(10 pts.) Consider the function

$$f(x) = x^3 + x - \frac{1}{x},$$

with domain $(0, \infty)$. With this restriction on the domain, show that the equation $f(x) = 0$ has one and exactly one real solution for $x \in (0, \infty)$. Identify the theorem(s) you are using and show the validity of the required conditions to apply the theorems are true to gain full credit.

Name: _____

Instructor: _____

15.(10 pts.) Let $f(x) = x - \sin(2x)$, with domain $(-\frac{\pi}{2}, \frac{\pi}{2})$.

(a) Find the critical numbers/points for f .

(b) Find the intervals where f is increasing and decreasing. (justify your answer)

(c) Classify the critical points as local maxima or local minima or neither and justify your conclusions in each case.

Name: _____

Instructor: _____

ROUGH WORK

Name: _____

Instructor: ANSWERS

Math 10550, EXAM II
October 13, 3016

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hr. and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 11 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)	(●)
2.	(a)	(●)	(c)	(d)	(e)
.....					
3.	(●)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(●)	(d)	(e)
.....					
5.	(a)	(b)	(c)	(d)	(●)
6.	(a)	(●)	(c)	(d)	(e)
.....					
7.	(a)	(b)	(●)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(●)
.....					
9.	(a)	(b)	(●)	(d)	(e)
10.	(●)	(b)	(c)	(d)	(e)
.....					
11.	(a)	(●)	(c)	(d)	(e)
12.	(a)	(b)	(c)	(●)	(e)

Please do NOT write in this box.

Multiple Choice _____

13. _____

14. _____

15. _____

Total _____