

Name: _____

Instructor: _____

Math 10550, Practice Exam I

- 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 minutes.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 12 problems.

Good Luck!

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

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Total multiple choice: _____

9. _____

10. _____

11. _____

12. _____

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Multiple Choice Questions

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

- (a) $-\infty$ (b) Does not exist and is not ∞ or $-\infty$.
(c) 1 (d) 0
(e) $+\infty$

2.(7 pts.) For what value a is the function f given by

$$f(t) = \begin{cases} \frac{\sqrt{4+t^2} - 2}{t^2} & t \neq 0 \\ a & t = 0 \end{cases}$$

continuous everywhere?

- (a) any value of a
(b) $a = \frac{1}{4}$
(c) No value of a makes f continuous everywhere.
(d) $a = 1$
(e) $a = \frac{1}{2}$

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3.(7 pts.) Compute the derivative of $\frac{\sin x + x}{2 + \cos x}$.

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

(b) $\frac{\cos x + 1}{-\sin x}$

(c) $\frac{(\cos x + 1)(2 + \cos x) - (\sin x + x) \sin x}{(2 + \cos x)^2}$

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

(e) $\frac{\sin x + x}{-\sin x}$

4.(7 pts.) If $f'(2) = 5$, $g(4) = 2$, $g(2) = 1$, $f(2) = -1$ and $g'(4) = 3$, find $\frac{d}{dx}(f \circ g)(4)$.

- (a) 30 (b) 15 (c) -15 (d) 6 (e) -30

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5.(7 pts.) Compute $\lim_{x \rightarrow 0} \frac{\sin(7x)}{\sin(5x)}$.

- (a) $\frac{7}{5}$ (b) 0 (c) 1
(d) Does not exist. (e) $\frac{5}{7}$

6.(7 pts.) If the cost function for producing x items is given by $C(x) = 500 + 2x + 0.1x^2$ dollars, then the marginal cost at the production level of 50 unit is:

- (a) 22 dollars (b) 850 dollars per item
(c) 850 dollars (d) 512 dollars per item
(e) 12 dollars per item.

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7.(7 pts.) The equation of the tangent line to $y = \sin(x^2) + 1$ at $(x, y) = (\sqrt{\pi/2}, 2)$ is

(a) $y = (2\sqrt{\pi/2})x + 2$

(b) $x = 2$

(c) $y = 2$

(d) $y = x + 2 - \sqrt{\pi/2}$

(e) $y = \pi(x - \sqrt{\pi/2}) + 2.$

8.(7 pts.) Find the derivative of $f(x) = (2 + x^4)^{2/3}$. $f'(x) =$

(a) $\frac{2}{3}(2 + x^4)^{-1/3}(2 + x^3)$

(b) $\frac{2}{3}(2 + x^4)^{-1/3}$

(c) $\frac{8}{3}(2 + x^4)^{1/3}x^3$

(d) $\frac{8}{3}(2 + x^4)^{-1/3}x^3$

(e) $\frac{2}{3}(2 + x^4)^{-1/3}x^3$

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Partial Credit

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

9.(11 pts.) Find the derivative of

$$y = \frac{1}{2x - 1}$$

using the definition of the derivative.

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10.(11 pts.) Show that the equation

$$x^4 + 2x^3 - 2 = 0$$

has at least two solutions. Identify the theorem you use.

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11.(11 pts.) If a ball is thrown vertically upward with a velocity of 64 ft/sec, then the distance it travelled is given by $s(t) = 64t - 16t^2$.

(a) What is the velocity after 1 second?

(b) When will the ball stop going upward? (Hint: What is the velocity when the ball stops going forward?)

(c) What is the maximum height this ball can reach?

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12.(11 pts.) Draw the graph of a continuous function $y = f(x)$ with $f(0) = 3$, $f'(0) = -1$, $f'(2) = 0$, and $f'(-2) = 2$.

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