

Name: \_\_\_\_\_

Instructor: \_\_\_\_\_

**Math 10550, Practice Exam II**  
**March 4, 2026**

- 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)
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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 \_\_\_\_\_

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**Multiple Choice**

1.(7 pts.) Find  $f''(0)$  if  $f(x) = \frac{4}{x+2}$ .

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

2.(7 pts.) Let  $h(x) = f \circ g(x) - \frac{f(x)}{g(x)}$ . If  $f(3) = 0$ ,  $g(3) = 1$ ,  $f'(3) = 3$ ,  $g'(3) = 4$ ,  $f'(1) = 7$ , and  $g'(2) = 5$ , then find  $h'(3)$ .

- (a) 30            (b) 10            (c) 25            (d) 0            (e) 20

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3.(7 pts.) A fly is moving on a straight line with position at time  $t$  is given by

$$s(t) = t \cos(\pi t),$$

where time,  $t$ , is measured in seconds and  $s(t)$  gives the distance (in feet) of the fly from the origin at time  $t$ . What is the acceleration of the fly when  $t = 1$ ?

- (a)  $-\pi \text{ ft/s}^2$
- (b)  $-1 \text{ ft/s}^2$
- (c)  $1 \text{ ft/s}^2$
- (d)  $(-1 - \pi) \text{ ft/s}^2$
- (e)  $\pi^2 \text{ ft/s}^2$

4.(7 pts.) Compute  $f'(x)$  if

$$f(x) = \sqrt{1 + \sin^2 x}.$$

- (a)  $\sin x \cos x \sqrt{1 + \sin^2 x}$
- (b)  $\frac{\sin x \cos x}{\sqrt{1 + \sin^2 x}}$
- (c)  $\frac{1}{2\sqrt{2} \sin x \cos x}$
- (d)  $\frac{\sin x}{\sqrt{1 + \sin^2 x}}$
- (e)  $\frac{\cos^2 x}{2\sqrt{1 + \sin^2 x}}$

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5.(7 pts.) Find  $y'$ , if

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

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

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

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

(d) The derivative does not exist.

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

6.(7 pts.) If  $\sin(\pi xy) = \pi(x + y)$  find  $\frac{dy}{dx}$  at  $(1, -1)$  by implicit differentiation.

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

(b)  $\pi$

(c) 1

(d) 0

(e) -1

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7.(7 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) 3 feet                      (b) 0 feet                      (c) 2 feet  
(d) 8 feet                      (e) 5 feet

8.(7 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) This beetle never stops.                      (b)  $t = 2$   
(c)  $t = 4$     (d)  $t = 1$   
(e)  $t = 3$

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9.(7 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) 18 ft<sup>2</sup>/second                      (b) 2 ft<sup>2</sup>/second                      (c) 9 ft<sup>2</sup>/second  
(d) -1 ft<sup>2</sup>/second                      (e) 10.5 ft<sup>2</sup>/second

10.(7 pts.) Find the derivative of  $f(x) = \tan(e^{x^2})$ .

- (a)  $\cot(e^{x^2})e^{x^2}$                       (b)  $-2x \sec^2(e^{x^2})e^{x^2}$   
(c)  $2x \cot(e^{x^2})e^{x^2}$                       (d)  $2x \sec^2(e^{x^2})e^{x^2}$   
(e)  $2x \sec^2(e^{x^2})$

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**11.**(7 pts.) If 100 grams of radioactive material with a half-life of two days are present at day zero, how many grams are left at day three?

- (a) 50      (b)  $\frac{100}{\sqrt{2}}$       (c)  $\frac{100}{\sqrt{8}}$       (d)  $\frac{100}{2^{1/3}}$       (e)  $\frac{100}{4^{1/3}}$

**12.**(7 pts.) Find the derivative of  $(x^2 + 1)^{x^2+1}$ .

- (a)  $(x^2 + 1)^{x^2+1}(2x \ln(x^2 + 1))$   
(b)  $(x^2 + 1)^{x^2+1} 2x(\ln(x^2 + 1) + 1)$   
(c)  $(x^2 + 1)^{x^2+1}$   
(d)  $2x(x^2 + 1)^{x^2}$   
(e) This function is not defined and hence has no derivative.

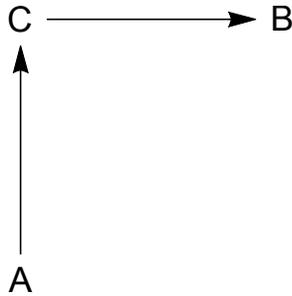
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**Partial Credit**

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

**13.**(12 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  $C$ .



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**14.**(12 pts.) Let  $C(t)$  be the concentration of a drug in the bloodstream. As the body eliminates the drug,  $C(t)$  decreases at a rate that is proportional to the amount of the drug that is present at the time. Thus  $C'(t) = kC(t)$ , where  $k$  is a constant. The initial concentration of the drug is 4 mg/ml. After 5 hours, the concentration is 3 mg/ml.

(a) Give a formula for the concentration of the drug at time  $t$ .

(b) How much drug will there be in 10 hours?

(c) How long will it take for the concentration to drop to 0.5 mg/ml?

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

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(a)(1 pt. No Partial credit) If  $y = \ln x$ ,  $y'' = \frac{1}{x^2}$ .

TRUE      FALSE

---

(b)(1 pt. No Partial credit) If  $y = \ln(2x)$ ,  $y' = \frac{1}{2x}$

TRUE      FALSE

---

(c)(1 pt. No Partial credit)  $(e^x)^2 = e^{2x}$ .

TRUE      FALSE

---

(d)(1 pt. No Partial credit)  $e^{a+b} = e^a + e^b$  for all real numbers  $a$  and  $b$ .

TRUE      FALSE

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**The following is the list of useful trigonometric formulas:**

Note:  $\sin^{-1} x$  and  $\arcsin(x)$  are different names for the same function and  $\tan^{-1} x$  and  $\arctan(x)$  are different names for the same function.

$$\sin^2 x + \cos^2 x = 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\frac{d}{dx} \tan^{-1} x = \frac{1}{1 + x^2}$$

$$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1 - x^2}}$$

$$\frac{d}{dx} \cos^{-1} x = \frac{-1}{\sqrt{1 - x^2}}$$

$$a^x = e^{x \ln(a)}$$

$$\log_a(x) = \frac{\ln(x)}{\ln(a)}$$

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## **Rough Work**

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**Multiple Choice** \_\_\_\_\_

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