

Name: _____

Instructor: _____

Multiple Choice

1.(5 pts.) Find $\frac{d}{dx}\left(\frac{\cot x}{x}\right)$.

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

2.(5 pts.) Find $\frac{d}{dx}(\sqrt[3]{x \cos x + 3x^2})$.

- (a) $\frac{\cos x - x \sin x + 6x}{3\sqrt[3]{(x \cos x + 3x^2)^2}}$ (b) $\frac{\cos x + 6x}{2\sqrt[3]{(x \cos x + 3x^2)^2}}$
(c) $\frac{\cos x + 6x}{2\sqrt[3]{\cos x - x \sin x + 6x}}$ (d) $\frac{1}{2\sqrt[3]{x \cos x + 3x^2}}$
(e) $\frac{1}{2\sqrt[3]{(\cos x - x \sin x + 6x)^2}}$

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3.(5 pts.) If $g(t) = (2t - 3)^4(t^3 + 1)^2$, find $g'(1)$.

- (a) 12 (b) -28 (c) -4 (d) 36 (e) -20

4.(5 pts.) Find $\frac{d}{dx}(\sin^2(2 \cos 3x))$.

- (a) $-12 \cos(2 \cos 3x) \sin 3x$ (b) $-12(\sin(2 \cos 3x)) \sin(3x)$
(c) $-12(\cos(2 \cos 3x)) \sin(3x)$ (d) $-12(\sin(2 \cos 3x))(\cos(2 \cos 3x)) \sin(3x)$
(e) $4 \sin(2 \cos 3x) \cos(2 \cos 3x) \sin 3x$

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5.(5 pts.) If $x^4y - y^5 = 11 + x^2y^3$, what is y' at the point $(2, 1)$?

- (a) $\frac{44}{7}$ (b) 28 (c) $\frac{-16}{11}$ (d) 24 (e) $\frac{-23}{4}$

6.(5 pts.) If $x^2 + y^2 = 25$, what is y'' when $y \neq 0$?

- (a) $\frac{-1}{y} + \frac{x^2}{y^3}$ (b) $\frac{-x}{y}$ (c) $\frac{-x}{y} + \frac{x^2}{y^3}$
(d) $\frac{-1}{y} - \frac{x^2}{y^3}$ (e) $\frac{-x}{2y} - \frac{x^2}{y^3}$

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7.(5 pts.) If $f(x) = \sin 3x$, find $f''(\frac{\pi}{4})$.

- (a) 0 (b) -9 (c) 3 (d) -3 (e) 9

8.(5 pts.) If $y = \cot x$, $x = \frac{\pi}{4}$, and $dx = 0.04$, then the differential dy is given by

- (a) 0.04 (b) $\sqrt{2}(0.02)$ (c) -0.08 (d) 0.08 (e) -0.04

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9.(5 pts.) The function $f(x) = x^4 + \frac{16}{3}x^3 - 10x^2 - 25$ has critical numbers at

- (a) $x = 5, 0, -1$ (b) $x = -2, 0$ (c) $x = -2, 0, 2$ (d) $x = -5, 0, 1$
(e) $x = -5, 1$

10.(5 pts.) Suppose $f'(x) = g'(x)$ for all x , and $f(0) = 3$ and $g(0) = 2$. If $f(8) = 5$, find $g(8)$.

- (a) 2 (b) 5 (c) 4 (d) 6 (e) -4

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Partial Credit

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

11.(10 pts.) A 10 ft ladder is leaning against a house when its base starts to slide away. By the time the base is 5 ft from the house, the base is moving at a rate of 2.5 ft/sec. How fast is the top of the ladder sliding down the wall then? (You do not have to simplify your answer.)

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12.(10 pts.) Use differentials (or, equivalently, a linear approximation) to estimate $\sqrt[4]{16.3}$. You may leave your answer as a fraction.

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13.(10 pts.) Find an equation for the tangent line to the curve $15xy^2+10y-20 = (x^2+y^2)^2$ at the point $(2, 1)$.

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14.(10 pts.) Find the absolute minimum and maximum of the function $f(x) = x^3 - 12x$ on the interval $[-4, 5]$.

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15.(10 pts.) Let $f(x) = \frac{1}{x}$ on the interval $[-4, -1]$. Check that the hypotheses of the Mean Value Theorem are satisfied for this function on this interval, and find all numbers c which satisfy the equation which is the conclusion of the Mean Value Theorem.

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Exam II
October 29, 2002

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for one hour.
- 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.

Good Luck!

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

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|-----|-----|-----|-----|-----|-----|
| 1. | (●) | (b) | (c) | (d) | (e) |
| 2. | (●) | (b) | (c) | (d) | (e) |
| 3. | (a) | (b) | (c) | (d) | (●) |
| 4. | (a) | (b) | (c) | (●) | (e) |
| 5. | (a) | (●) | (c) | (d) | (e) |
| 6. | (a) | (b) | (c) | (●) | (e) |
| 7. | (a) | (●) | (c) | (d) | (e) |
| 8. | (a) | (b) | (●) | (d) | (e) |
| 9. | (a) | (b) | (c) | (●) | (e) |
| 10. | (a) | (b) | (●) | (d) | (e) |

DO NOT WRITE IN THIS BOX!

Total multiple choice: _____

11. _____

12. _____

13. _____

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