

Multiple Choice

1.(5 pts.) Suppose $f(x)$ is a one-to-one function on its domain and $f(2) = 6$, $f(6) = 3$, $f'(2) = 4$, and $f'(6) = 5$. Find $(f^{-1})'(6)$.

- (a) 4 (b) $1/5$ (c) $1/4$ (d) $3/4$ (e) 5

2.(5 pts.) Of the following functions with specified domains, which one does NOT have an inverse function?

- (a) $x^3 + 2$ for $-\infty < x < \infty$ (b) $\sin x$ for $-\pi/2 \leq x \leq \pi/2$
(c) x^2 for $0 \leq x < \infty$ (d) $\ln x$ for $0 < x < \infty$
(e) $\cos x$ for $-\pi/2 \leq x \leq \pi/2$

3.(5 pts.) Solve the following equation for x .

$$\ln(7 - e^{2x}) = 1 .$$

- (a) There is no solution. (b) $x = \ln \sqrt{7 - e}$ (c) $x = \ln \sqrt{7} - \ln \sqrt{e}$
(d) $x = \ln(7 - e)^{-2}$ (e) $x = \ln \sqrt{7}$

4.(5 pts.) Find $f'(x)$ for

$$f(x) = \ln(x^2 + 2) + \arcsin(x^{-1}) .$$

- (a) $\frac{2x + 2}{x^2 + 2} - \frac{1}{x^2 + 1}$ (b) $\frac{2x}{x^2 + 2} - \frac{1}{\sqrt{x^4 - x^2}}$
(c) $\frac{2x}{x^2 + 2} - \frac{x \ln x}{\sqrt{x^2 - 1}}$ (d) $\frac{1}{x^2 + 2} - \frac{x}{\sqrt{x^2 - 1}}$
(e) $\frac{1}{x^2 + 2} - \frac{1}{\sqrt{x^2 - x^4}}$

5.(5 pts.) Find the equation of the tangent line to $f(x)$ at $x = 1$ if

$$f(x) = e^{\sqrt{x}+4} .$$

- (a) $y = e^5 + e^{5/2}(x - 1)$ (b) $y = e^5 + \frac{1}{5}(x - 1)$
(c) $y = \frac{e^5}{2} + e^5(x - 1)$ (d) $y = e^5 - \frac{e^5}{2}(x + 1)$
(e) $y = e^5 + \frac{e^5}{2}(x - 1)$

6.(5 pts.) Evaluate the following definite integral.

$$\int_1^e \frac{2x^3 + x + 1}{x^2} dx .$$

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

7.(5 pts.) Simplify the following expression for x .

$$x = \log_3 81 + \log_3 \frac{1}{9} .$$

- (a) $x = 9$ (b) $x = \ln 3$ (c) $x = \ln 9 - \ln 3$
(d) $x = 2$ (e) $x = 6$

8.(5 pts.) Find $f'(x)$ if

$$f(x) = x^{\ln x} .$$

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

13.(15 pts.) Evaluate the following limit.

$$\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x} .$$

Please show your work.

14.(15 pts.) Calculate the following indefinite integral.

$$\int x \ln x \, dx .$$

Please show your work.

Name: ANSWERS

Instructor: ANSWERS

Exam I
February 3, 2004

- 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 5 pages of the test.

Good Luck!

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

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|-----|-----|-----|-----|-----|-----|
| 1. | (a) | (b) | (●) | (d) | (e) |
| 2. | (a) | (b) | (c) | (d) | (●) |
| 3. | (a) | (●) | (c) | (d) | (e) |
| 4. | (a) | (●) | (c) | (d) | (e) |
| 5. | (a) | (b) | (c) | (d) | (●) |
| 6. | (●) | (b) | (c) | (d) | (e) |
| 7. | (a) | (b) | (c) | (●) | (e) |
| 8. | (a) | (b) | (●) | (d) | (e) |
| 9. | (a) | (b) | (●) | (d) | (e) |
| 10. | (a) | (b) | (c) | (●) | (e) |
| 11. | (●) | (b) | (c) | (d) | (e) |

DO NOT WRITE IN THIS BOX!

Total multiple choice: _____

12. _____

13. _____

14. _____

Total: _____