

Name: _____

Instructor: Bullwinkle

If Cao please indicate 10:40 or 11:45

Exam I

February 5, 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 10 pages of the test.

Good Luck!

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

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|-----|-----|-----|-----|-----|-----|
| 1. | (a) | (b) | (c) | (d) | (e) |
| 2. | (a) | (b) | (c) | (d) | (e) |
| 3. | (a) | (b) | (c) | (d) | (e) |
| 4. | (a) | (b) | (c) | (d) | (e) |
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| 12. | (a) | (b) | (c) | (d) | (e) |

DO NOT WRITE IN THIS BOX!

Total multiple choice: _____

13. _____

14. _____

15. _____

Total: _____

Multiple Choice

1.(5 pts.) Solve the following equation for x .

$$\ln(x + 6) + \ln(x - 3) = \ln 5 + \ln 2$$

- (a) $x = 4$ (b) $x = 4, x = -5$ (c) $x = 5, x = 2$
(d) $x = 5, x = -7$ (e) $x = 2$

2.(5 pts.) The derivative of $x^{\ln x}$ is equal to

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

3.(5 pts.) Evaluate $\int_0^{\pi/4} \tan x \, dx$

- (a) $\ln(4)$ (b) $\ln(\pi/4)$ (c) $\ln(\sqrt{2})$ (d) $\ln(\sqrt{3}/2)$ (e) 0

4.(5 pts.) Evaluate $\int_0^1 3^{x^2} x \, dx$

- (a) $\frac{2}{\ln 3}$ (b) $\frac{\ln 6}{\ln 3}$ (c) 0 (d) 2 (e) $\frac{1}{\ln 3}$

5.(5 pts.) Find $\lim_{x \rightarrow 0^+} \frac{\ln x}{x}$

- (a) ∞ (b) 1 (c) $-\infty$ (d) 2 (e) 0

6.(5 pts.) Evaluate $\int \frac{e^x}{\sqrt{1 - e^{2x}}} \, dx$

- (a) $\arctan(e^x) + C$ (b) $\arcsin(e^x) + C$ (c) $\operatorname{arcsec}(e^x) + C$
(d) $\ln(\sqrt{1 - e^{2x}}) + C$ (e) $\ln(1 - e^{2x}) + C$

7.(5 pts.) Find $\lim_{x \rightarrow \infty} \frac{x^2}{e^x}$

- (a) $\frac{2}{e}$ (b) ∞ (c) 0 (d) e^2 (e) Does not exist

8.(5 pts.) Evaluate $\int_1^e \frac{\ln x}{x} dx$

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

9.(5 pts.) The function $x^3 - 2x$ is increasing for $x \geq 1$. What is the value for the derivative of f^{-1} for $x = 4$?

- (a) $-\frac{1}{2}$ (b) $\frac{1}{40}$ (c) $\frac{1}{54}$ (d) $\frac{1}{10}$ (e) $\frac{1}{4}$

10.(5 pts.) Evaluate $\int_1^e x^2 \ln x dx$

- (a) $\frac{1}{2}(e^3 - 1)$ (b) $\frac{1}{9}(2e^3 + 1)$ (c) 0 (d) $\frac{1}{6}(e^3 + 2)$ (e) $\frac{e}{3}$

11.(5 pts.) Evaluate $\int_{-1}^1 \arcsin x dx$

- (a) π (b) $\frac{\pi}{2}$ (c) $1 - \frac{\pi}{4}$ (d) 2π (e) 0

12.(5 pts.) Find the derivative of $(\operatorname{arcsec} x)^3$

- (a) $\frac{-3 \tan x}{(\sec x)^3}$ (b) $\frac{3(\operatorname{arcsec} x)^2}{x\sqrt{x^2 - 1}}$
(c) $\frac{3(\operatorname{arcsec} x)^2}{1 + x^2}$ (d) $3(\operatorname{arcsec} x)^2((\operatorname{arcsec} x)(\arctan x))$
(e) $\frac{3(\operatorname{arcsec} x)^2}{\sqrt{1 - x^2}}$

Partial Credit

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

13.(12 pts.) Find the area under the region bounded by the curves $y = 2^x$ and $y = 5^x$, between $x = 0$ and $x = 1$.

14.(12 pts.) Evaluate the limit:

$$\lim_{x \rightarrow 0^+} (\sin x)^{\tan x}$$

15.(16 pts.) Use logarithmic differentiation to find the derivative of

$$y = \frac{(x^2 + 1)^{2.2}(x + 1)^{1.2}}{(x^3 - 1)^{0.3}}$$

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