

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

Instructor:  Bullwinkle

Exam II  
March 20, 2001

- 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 9 pages of the test.

Good Luck!

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

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

DO NOT WRITE IN THIS BOX!

Total multiple choice: \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

12. \_\_\_\_\_

**Total:** \_\_\_\_\_

### Multiple Choice

1.(6 pts.) Solve the following integral  $\int \arctan(x) dx$ .

- (a)  $\frac{1}{2}(\arctan(x))^2 + C$                       (b)  $x \cdot \arctan(x) - 1/2 \ln|1+x^2| + C$   
(c)  $x \tan(x) + \ln|x+1| + C$                       (d)  $\ln|1+x^2| + C$   
(e)  $\log|1+x| + C$

2.(6 pts.)  $\int_0^1 \sinh^2(x) \cosh(x) dx = ?$

- (a) 0                      (b)  $\frac{1}{3}$                       (c)  $\frac{1}{3e^3}$                       (d)  $\frac{(\cosh)^3(1)}{3}$                       (e)  $\frac{\sinh^3(1)}{3}$

3.(6 pts.) Find  $A$  and  $B$  such that:

$$\frac{5}{x^2 - x - 6} = \frac{A}{x+2} + \frac{B}{x-3}.$$

- (a)  $A = -1, B = 1$                       (b)  $A = 1, B = -1$                       (c)  $A = 0, B = 2$   
(d)  $A = \frac{2}{5}, B = \frac{-3}{5}$                       (e)  $A = 1, B = -2$

4.(6 pts.) Expand  $\frac{x}{(x-1)^2}$  as a sum of partial fractions.

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

5.(6 pts.) Find  $\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$ .

- (a)  $-\frac{1}{3}$                       (b) Does not exist      (c)  $-\frac{1}{6}$                       (d) 0  
(e)  $\frac{1}{2}$

6.(6 pts.) Find  $\int x^2 \ln x \, dx$  for  $x > 0$ .

- (a)  $\frac{\ln x^3}{2} + C$                       (b)  $\frac{\ln x}{x} + C$   
(c)  $\frac{\ln x}{x} - \frac{x^3}{4} + C$                       (d)  $x \ln x - \frac{x^3}{4} + C$   
(e)  $\frac{x^3}{3} \ln x - \frac{x^3}{9} + C$

7.(6 pts.) Find  $\lim_{x \rightarrow \infty} \frac{x^2}{e^x}$ .

- (a)  $e^2$                       (b) Does no exist      (c)  $\frac{2}{e}$                       (d) 0  
(e)  $\infty$

8.(6 pts.) In the integral  $\int_1^{\sqrt{3}} \frac{dx}{(1+x^2)^3}$  make the trig. substitution  $x = \tan \theta$ . Which integral below has the same value?

- (a)  $\int_{\pi/4}^{\pi/6} \cos^4 \theta \, d\theta$       (b)  $\int_{\pi/4}^{\pi/3} \sin^4 \theta \, d\theta$       (c)  $\int_{\pi/4}^{\pi/3} \cos^4 \theta \, d\theta$       (d)  $\int_{\pi/4}^{\pi/6} \sin^4 \theta \, d\theta$   
(e)  $\int_{\pi/4}^{\pi/3} \csc^4 \theta \, d\theta$

### Partial Credit

9.(13 pts.) Find

$$\int \frac{2x^3 - 2x^2 + 1}{x^2 - x} \, dx$$

10.(13 pts.) Find

$$\int \frac{x^2}{\sqrt{9 - 16x^2}} dx$$

11.(13 pts.) Find  $\int e^{\sqrt{x}} dx$

12.(13 pts.) Evaluate the limit:

$$\lim_{x \rightarrow 0} (1 + 2x)^{1/x}$$

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