

MARK BOX		
Problem	Points	
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

MATH 142 sections 004 & 005  
 FALL 1993 EXAM # 1

NAME: \_\_\_\_\_

SSN: \_\_\_\_\_

Instructions:

- (1) To receive credit, you must work in a logical fashion, SHOW ALL YOUR WORK, INDICATE YOUR REASONING, and when applicable put your answer on the line (or in the box) provided.
- (2) The “Mark Box” indicates the problems along with their points. Check that your copy of the exam has all of the problems.
- (3) During this test, do not leave your seat. Raise your hand if you have a question. When you finish, turn your exam over, put your pencil down, and raise your hand.
- (4) No “formula sheets” allowed. Calculators are not allowed.
- (5) This is a closed book/closed notes exam covering (from *Calculus & A.G.* by Edwards & Penny) sections 7.2–7.5, 8.2–8.3, 9.2–9.7.

1. Find  $\frac{dy}{dx}$  for:

1a)  $y = \operatorname{arcsec} x$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

1b)  $y = e^x$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

1c)  $y = x^e$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

1d)  $y = 3^x$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

1e)  $y = e^e$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

1f)  $y = x^x$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

1g)  $y \ln x + xe^y = 3$     Answer:  $\frac{dy}{dx} =$  \_\_\_\_\_ .

2. Evaluate the following 4 integrals.    ⊗ hint: +C ...

2a)  $\int \sin^3 x \cos^2 x \, dx =$  \_\_\_\_\_

2b)  $\int \ln(2x + 7) \, dx =$  \_\_\_\_\_

⊗ show your work on the back of the previous page.

2c)  $\int \frac{dx}{(4x^2 + 9)^2} =$  \_\_\_\_\_

2d)  $\int \frac{x^3 + 2x^2 + x + 1}{x^4 + x^2} dx =$  \_\_\_\_\_

⊗ show your work on the back of the previous page.

3. Graph  $y = 2^x$ . The inverse of  $y = 2^x$  is the function  $y =$   .  
Graph the inverse function of  $y = 2^x$  on the same grid. Be sure to label your functions.

4.

- 4a) Let  $y = f(x)$  and  $y = g(x)$  be two functions defined for  $x > 0$ . If for all  $x > 0$ , you know that  $f'(x) = g'(x)$ , then what can you say about  $f$  and  $g$ ?
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- 4b) Using part (4a) and the fact that  $D_x \ln x = \frac{1}{x}$ , show the following Law of Logarithm:

$$\boxed{\ln\left(\frac{1}{x}\right) = -\ln x}$$

*CLEARLY* explain your steps! Do NOT use other Laws of Logarithm!

5. In 1921, President Warren G. Harding presented Marie Curie a gift of 2 gram of radium on behalf of the women of the United States. Using the fact that the half-life of radium is 1656 years, determine how much of the original 2 -gram gift is left today (in 1993). Your answer can involve exponentials and logs.

Answer: \_\_\_\_\_ gram