

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 ?

- 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