

This exam is CLOSED NOTES and CLOSED BOOK. There are NO CALCULATORS allowed. To get full credit you must show all work neatly in the space provided on the test paper.

1. (40 pts) Evaluate the following derivatives.

a.  $\frac{d}{dx}(\ln(1 - 3x))$

b.  $\frac{d}{dx}(x \ln(\sqrt{1 + x + x^2}))$

[Problem 1 continues on page 2]

c.  $\frac{d}{dx} (e^{1-5x} \sin x)$

d.  $\frac{d}{dx} ((1 + e)^x)$

[Problem 1 continues on page 3]

e.  $\frac{d}{dx}((1+x^2)^x)$

2. (40 pts) Evaluate the following integrals.

a.  $\int \frac{\sin(2x)}{\cos(2x) + 2} dx$

b.  $\int \frac{x}{1 + 4x^2} dx$

[Problem 2 continues on page 5]

c.  $\int \frac{4}{1+4x^2} dx$

d.  $\int e^x + e^{-x} + x^e + x^{-e} + e^e + e^{-e} dx$

[Problem 2 continues on page 6]

e.  $\int \frac{\ln(5x)}{x} dx$

3. (10 pts.) Do the following integrals.

[Hint: Try integration by parts.]

a.  $\int x^2 e^{2x} dx$

[Problem 3 continues on page 8]

b.  $\int e^{-x} \sin(2x) dx$

4. (**10 pts.**) a. A sample of bacteria grows exponentially. Suppose the sample weighs 3 pounds initially, and weights 4 pounds 3 days later.

a) How much will be there on the seventh day?

b) What is the doubling time?

Prob	Pts
1	
2	
3	
4	
Total	