

Calculus I-01  
Exam 3

Write solutions completely for maximum credit. Put all work on separate pages and keep this page for your reference. Each of the four problems is worth 10 points.

1. Differentiate each of the following with respect to  $x$ :

a.  $xe^{-x^2}$

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

2. Integrate each of the following with respect to  $x$ :

a.  $\int \frac{\cos(x/2)}{1+\sin(x/2)} dx$ , making the substitution  $u = 1 + \sin(x/2)$

b.  $\int \frac{1}{(2x+1)\ln(2x+1)} dx$ , making the substitution  $u = \ln(2x+1)$

3. Suppose that  $f$  is a function defined by  $f(x) = \frac{4}{1+2\ln x}$ , and assume that  $f$  is 1-1.

a. Determine  $f'(x)$ .

b. Determine a formula for  $f^{-1}(x)$

4. Assume that the equation  $xe^y + y = 1$  defines  $y$  implicitly as a function of  $x$ .

a. Determine the value of  $\frac{dy}{dx}$  at the point  $(1,0)$ .

b. Determine where the  $y$ -axis intersects the tangent line to the graph of the equation  $xe^y + y = 1$  at the point  $(1,0)$ . (If you do not get an answer to part a, state an assumption for the answer to part a in order to answer this part of the problem.)