

NAME:

Math 106 - Exam 1 - February 1, 2008

Instructions: Show all of your work and circle your final answers. Your work should flow logically and be easy to follow. Cross out any work that you do not want considered. Calculators are allowed, but notes and books are not.

Problem	Max	Score
1	18	
2	10	
3	16	
4	6	
5	10	
6	10	
TOTAL	70	

1. (18 points) Evaluate the following:

(a) $\int_1^e \frac{\cos(\ln x)}{x} dx.$

(b) $\int x\sqrt{2x-1} dx.$

2. (10 points) Let $I = \int_{\frac{1}{2}}^{\frac{3}{2}} \ln x dx$.

(a) How large must n be to ensure that M_n approximates I with error at most .001?

(b) Will L_{100} underestimate or overestimate I ? Explain. (You do not need to evaluate L_{100} .)

3. (16 points) Consider the IVP $y' = \frac{y^2}{1+t^2}$, $y(0) = 1$.

(a) By hand, use Euler's method with step size $\Delta t = 1$ to approximate $y(2)$.

(b) Using the technique of separation of variables, find the solution to the above IVP.

4. (6 points) Write down an integral that gives the length of the curve $y = \sqrt{x}$ from $x = 1$ to $x = 4$.

5. (10 points) Consider the region in the xy -plane bounded by the graphs of $x = y^2 - 4$ and $y = -x + 2$. Find an integral (or sum of integrals) that represents the area of the region. You do not need to evaluate the integral(s).

6. (10 points) Consider the region in the first quadrant of the xy -plane that is bounded by the graphs of $y = x^2 + 1$, $y = 2x^2$, and $x = 0$. Write down an integral (or a sum of integrals) that represents the volume of the solid obtained by revolving this region around the y -axis. You do not need to evaluate the integral(s).