

Math 1B Midterm 1 2009 Feb 19 12:30pm-2:00pm

You are allowed 1 sheet of notes. Calculators are not allowed. Each question is worth 3 marks, which will only be given for correct working and a clear and correct answer in simplified form. Write the final answer to each question on the cover-sheet, and attach the cover-sheet to your bluebook.

1. Evaluate the indefinite integral $\int x e^{-x} dx$.
2. Evaluate the integral $\int_0^{\pi/2} \sin(t)^2 dt$.
3. Evaluate the integral $\int \frac{t}{\sqrt{1-t^2}} dt$.
4. Find the partial fraction decomposition of $\frac{1}{x^3-x^2}$.
5. Evaluate the integral $\int_2^3 \frac{1}{x^2-1} dx$.
6. Use Simpson's rule with 3 points to approximate the integral $\int_0^2 \frac{2^x+2}{1+x} dx$.
7. Use the comparison theorem to determine whether the following integral is convergent:
 $\int_1^{\infty} \frac{\cos(x)^2}{1+x^2} dx$.
8. Find the values of p for which the integral $\int_1^{\infty} x^{-p} dx$ converges, and evaluate it for these values of p .
9. Evaluate the integral $\int_0^{\infty} x e^{-x^2} dx$.
10. Find the length of the curve $y = \cosh(x)$ for $0 \leq x \leq 1$. (You may give your answer as the value of an elementary function.)
11. Sketch the curve $x^{2/3} + y^{2/3} = 1$ and find its length.
12. Find the centroid of the region bounded by the curves $y = 0$, $y = 1 - x^2$.