MT-A143-01 Exam One Fall 2004

You may keep this page of questions. Turn in your answers with all of your work on the ivory paper and the pink paper. You are NOT allowed to use your calculator on the first six questions. Answer these six questions on the ivory paper. When you have completed these six questions, turn in all of the ivory paper and receive pink paper to use on the last two questions. You ARE allowed to use your calculator on the last two questions and you will need your calculator for some parts of the last two questions.

(1) 10 Points. Write down the abstract partial fractions decomposition for

$$f(x) = \frac{x^7 - 3x^6 + 5x + 8}{(x+7)(x^2-2x+10)(x-1)^3(x^2+5)^2}.$$

Evaluate the following antiderivatives and definite integrals.

(2) 10 Points. $\displaystyle\int_1^2 \sqrt{8t-1}\,dt.$ **(3)** 15 Points. $\displaystyle\int x^2 e^{-3x}\,dx.$

(4) 15 Points. $\displaystyle\int \frac{x^2-3x+29}{(x+2)(x^2+9)}\,dx.$

(5) 16 Points. $\displaystyle\int \frac{dx}{x^2\sqrt{b^2-x^2}}.$ Assume that $b \neq 0$.

(6) 12 Points. Given that $\int_2^6 f(x)\,dx = 11$ and $\int_6^{12} f(x)\,dx = 17$, use these to evaluate:

(a) $\displaystyle\int_2^4 f(3x)\,dx$ and **(b)** $\displaystyle\int_1^3 f(5x-3)\,dx$

Turn in the above work on the ivory paper and receive pink paper to use for the last two questions. The answer to each question is a number. You are required to show sufficient work to explain how you arrived at your answer.

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(7) 10 Points. Suppose that $I = \int_2^{27} f(x)\,dx$ and that on the interval $[2, 27]$ we have $|f'(x)| \leq 16$, $|f''(x)| \leq 36$, $|f'''(x)| \leq 53$ and $|f^{(4)}(x)| \leq 75$. Find a value of n which is large enough to guarantee that $|I - M_n| \leq 0.000005$ where M_n is the n^{th} midpoint rule approximation for I. Show your work!

(8) 12 Points. Given the following table of values for the function f, find the Simpson's Rule approximation, S_4, for $\int_3^{11} f(x)\,dx$.

x	3.00	5.00	7.00	9.00	11.00
$f(x)$	4.89	9.82	12.13	8.74	6.25