MATH143-01 Exam One Spring 2008

You may keep this page of questions. Turn in your answers with all of your work on the colored paper.

NO CALCULATORS ARE ALLOWED FOR THIS EXAM.

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

$$f(x) = \frac{x^9 - 5x^8 + x^3 - 7x}{(x+3)(x-5)^4(x^2+4)^3(x^2-4x+13)}.$$

Evaluate the following antiderivatives and definite integrals.

(2) 10 Points. $\displaystyle\int \frac{4x+5}{x^2+16}\,dx.$ **(3)** 10 Points. $\displaystyle\int \frac{t}{(t^2+36)^5}\,dt.$

(4) 14 Points. $\displaystyle\int_0^2 xe^{-3x}\,dx.$ **(5)** 14 Points. $\displaystyle\int \cos(3\theta)\cos(7\theta)\,d\theta.$

(6) 16 Points. $\displaystyle\int \sqrt{r^2-x^2}\,dx.$ Assume that $r > 0$.

(7) 10 Points. Given that $\int_1^5 g(x)\,dx = 10$ and $\int_5^{13} g(x)\,dx = 7$, use one or both of these to evaluate:

$$\int_1^3 g(4x+1)\,dx.$$

(8)

(a) 2 Points. Plot, in the xy-plane, the seven points given in the table below.

(b) 2 Points. On your graph, sketch any reasonable continuous function f that would pass through these seven points.

(c) 8 Points. Use the table to calculate the midpoint approximation MID(3) for $\int_1^7 f(x)\,dx$. Write down explicitly the values that you are using for $\Delta x, m_1, m_2$ and m_3.

(d) 4 Points. Is MID(3) larger than $\int_1^7 f(x)\,dx$, smaller than $\int_1^7 f(x)\,dx$ or very close in value to $\int_1^7 f(x)\,dx$? This will depend upon **your** choice of a graph for $y = f(x)$ in part **(b)**. Expain! [Hint: You may draw rectangles on your graph representing the area calculated by MID(3).]

x	1	2	3	4	5	6	7
$f(x)$	2.3	2.2	1.9	1.8	2.3	3.8	4.1