MA1125 – Calculus
Homework #9
due Thursday, Nov. 22

1. Compute each of the following indefinite integrals.

$$\int \frac{x^3 - 3x + 2}{x + 3}\, dx, \qquad \int \frac{x + 3}{x^3 - 3x + 2}\, dx.$$

2. Compute each of the following indefinite integrals.

$$\int \frac{x + 3}{x + \sqrt{x}}\, dx, \qquad \int \frac{e^x + 3}{e^x + 1}\, dx.$$

3. Compute each of the following indefinite integrals.

$$\int \frac{\sin^3 x}{\cos^8 x}\, dx, \qquad \int \frac{3x + 1}{x^2 + 2x + 5}\, dx.$$

4. Show that each of the following sequences converges.

$$a_n = \cos \frac{n^2 + 2}{n^3 + 1}, \qquad b_n = \frac{(-1)^n}{n^2}, \qquad c_n = n \sin \frac{1}{n}.$$

5. Define a sequence $\{a_n\}$ by setting $a_1 = 1$ and $a_{n+1} = \sqrt{2a_n + 1}$ for each $n \geq 1$. Show that $1 \leq a_n \leq a_{n+1} \leq 3$ for each $n \geq 1$, use this fact to conclude that the sequence converges and then find its limit.

- This assignment is due by Thursday noon, either in class or else in my office.
- Write your name and course (Maths, TP, TSM) on the first page of your homework.
- NO LATE HOMEWORK WILL BE ACCEPTED.