MA 263-25 (Numerical Analysis), Dr. Chernov Full credit is given for 5 (out of 6) problems Due Thur, Nov 16 by 4:30 pm

1. Computer problem C-8.3.1 (page 589). The analytic solution can be found by separation of variables or by Maple or MatLab.

2. Computer problem C-8.2.2 (page 577).

3. Computer problem C-7.5.1(b) (page 552). Use  $\varepsilon = 10^{-6}$  and n = 1000.

4. Run a computer program with the Romberg integration method (with M = 8) on the example

$$\int_0^1 e^{x^2} \, dx$$

5. For the integral in Problem 4, find the safe value of n for the midpoint algorithm, trapezoid algorithm and Simpson's algorithm. Set  $\varepsilon = 10^{-8}$ . Run a computer program with Simpson's algorithm and the corresponding safe value of n. Note: the derivatives of the function  $f(x) = e^{x^2}$  are monotonically increasing, hence  $M_2 = f''(1)$  and  $M_4 = f^{(4)}(1)$ .

6. Compute all real roots (including multiplicities) of the polynomial

$$P(x) = x^7 - 2x^6 - 5x^5 + 18x^4 - 25x^3 + 26x^2 - 19x + 6$$