261: 3rd Assessment

Deadline: Friday 25th April 2003

These questions are all paper and pen exercises. You can leave your solutions in the box outside room G29 of the O'Reilly building. To find G29, turn left after entering the ORI from the Hamilton concourse and go through the double doors. G29 is at the very end of the corridor at the right.

Question 1) The following data points are in the format (x, y): $(0, 2), (1, 3), (2, 3), (3, 2)$. Use the Lagrange polynomials to create an interpolating polynomial, $g(x)$. What are the coefficients of this polynomial?

Question 2) Here is a second set of data points in the format (x, y): $(0, -5), (1, -1), (2, 1), (3, 5)$. Use Neville's algorithm to construct a polynomial that interpolates between them. What are the coefficients?

Question 3) For a third set of data points take: $(0, 1), (1, 2), (2, 2), (3, 3)$. Use Newton's divided difference scheme to derive an interpolating polynomial. Simplify the polynomial to the form $a_0 + a_1x + a_2x^2 + a_3x^3$. What are the values of the coefficients a_0, a_1, a_2 and a_3?

Question 4) For the data points $(0, 4), (1, 1), (2, 3)$, use rational function to construct an interpolating function.

Question 5) For the data points $(0, 1), (1, 2), (2, 2)$, use the Newton-Cotes Scheme to approximate the integral of the function from which they are sampled. What values of α_i do you obtain?

Question 6) Use the extended trapezoidal rule to approximate the integral of the function, from which the following points are taken: $(0, 2), (2, 4), (4, 4), (6, 1), (8, 0), (10, -1), (12, 3)$.