MATH 609-600
Homework #4
Polynomial, Birkhoff, and Spline Interpolation

The homework should be presented at the beginning of the class. Penalty for delaying the homework is 5 pts per day.

(1) (20 pts) (Kincaid and Cheney, Section 6.2, problem 23) The polynomial $p(x) = 2 - (x+1) + x(x+1) - 2x(x+1)(x-1)$ interpolates the first four points in the table $(-1, 2), (0, 1), (1, 2), (2, -7), (3, 10)$. By adding one additional term to p, find polynomial that interpolates the whole table.

(2) (20 pts) Find the algebraic polynomial of the lowest degree (using divided differences) that interpolates the data

$$x = 0, f(0) = 0, f'(0) = 0, f''(0) = 1, \ x = 1, f(1) = 1, f'(1) = 0, f''(1) = 1$$

and prove that the polynomial is unique.

(3) (20 pts) Find the periodic cubic spline that interpolates the data: $(0, 0)$, $(\frac{1}{2}, 1)$, $(1, 0)$.

(4) (20 pts) (Kincaid and Cheney, Section 7.1, problem 16)

(5) (20 pts) (Kincaid and Cheney, Section 7.2, problem 23)