

1. Use Gauss elimination with partial pivoting and five-digit rounding arithmetic to solve the system $Ax = b$, and rounding the value to five decimal places.

$$A = \begin{pmatrix} 31 & -13 & 0 & 0 & 0 & -10 & 0 & 0 & 0 \\ -13 & 35 & -9 & 0 & -11 & 0 & 0 & 0 & 0 \\ 0 & -9 & 31 & -10 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -10 & 79 & -30 & 0 & 0 & 0 & -9 \\ 0 & 0 & 0 & -30 & 57 & -7 & 0 & -5 & 0 \\ 0 & 0 & 0 & 0 & -7 & 47 & -30 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -30 & 41 & 0 & 0 \\ 0 & 0 & 0 & 0 & -5 & 0 & 0 & 27 & -2 \\ 0 & 0 & 0 & -9 & 0 & 0 & 0 & -2 & 29 \end{pmatrix}$$

$$b = (-15 \ 27 \ -23 \ 0 \ -20 \ 12 \ -7 \ 7 \ 10);$$

2. To construct the cubic spline interpolant S for the function $f(x) = \frac{1}{1+x^2}$, $-5 \leq x \leq 5$ and the nodes $x_i = -5 + i, i = 0, 1, \dots, 10$, satisfying $S''(x_0) = S''(x_n) = 0$, and figure $S(x)$.