You may freely collaborate on section problems. They are not collected. Solutions are discussed in section and posted on the website. For maximum benefit, it is best to actually write MATLAB solutions and run them. Section problems and their variations can appear on course examinations. Problems are generally taken from Introduction to Scientific Computing-A Matrix-Vector Approach Using Matlab by C. Van Loan.

P3.3.7
Suppose $S(x)$ is a cubic spline interpolant of the data $(x_1, y_1), \ldots, (x_n, y_n)$ obtained using `spline`. Write a MATLAB function $d3 = \text{MaxJump}(S)$ that returns the maximum jump in the third derivative of the spline $S$ assumed to be in the $pp$-representation. Vectorize as much as possible. Use the `max` function.

P3.3.3
Let $S(z)$ be the natural spline interpolant of $z^3$ at $z = -3, z = -1, z = 1, z = 3$. Does it follow that $S(0) = 0$?

P3.3.4
Given $\sigma > 0$, $(x_i, y_i, s_i)$, and $(x_{i+1}, y_{i+1}, s_{i+1})$, show how to determine $a_i, b_i, c_i, d_i$ so that

$$g_i(x) = a_i + b_i(x - x_i) + c_i e^{\sigma(x-x_i)} + d_i e^{-\sigma(x-x_i)}$$

satisfies $g_i(x_i) = y_i$, $g'_i(x_i) = s_i$, $g_i(x_{i+1}) = y_{i+1}$, and $g'_i(x_{i+1}) = s_{i+1}$.

P4
Complete the following function so that it performs as specified

```matlab
function T = Add(S,p)
% S is a pp-representation of a cubic spline s(x)
% p is a column 4-vector that defines a cubic polynomial c:
% c(x) = p(1)x^3 + p(2)x^2 + p(3)x + p(4)
% T is a pp-representation of the cubic spline t(x) = s(x) + c(x)
% t should have the same breakpoints as s.
```