**Programming assignment #5**

Write a MATLAB function that implements shape functions and their derivatives for 2-node, 3-node, and 4-node one-dimensional elements (linear, quadratic, cubic) in terms of the parent coordinate $1 \leq \xi \leq 1$. Assume element nodes are equally spaced in the parent coordinates.

**Instructions for programming and assignment submission:**

- The file **must** define a function of the same name as the file name (but without the ".m"), however, it is recommended to follow the following format and define 4 functions.

```
function [N, dNdp] = asurite_hw5(p, nne)
    if nne == 2
        [N, dNdp] = shape2(p);
    elseif nne == 3
        [N, dNdp] = shape3(p);
    elseif nne == 4
        [N, dNdp] = shape4(p);
    end
end

function [N, dNdp] = shape2(p)
    % Define linear shape functions and derivatives
end

function [N, dNdp] = shape3(p)
    % Define quadratic shape functions and derivatives
end

function [N, dNdp] = shape4(p)
    % Define cubic shape functions and derivatives
end
```

- The order of the input variables and output variables must not be changed.
- **The input variables are:**
    - **p:** the parent coordinate $\xi$ to compute the shape functions at.
    - **nne:** the number of nodes per element.
- **The output variables are:**
    - **N:** nne×1 array of element shape functions.
    - **dNdp:** nne×1 array of element shape functions derivatives.
- If the input variable **nne = 2**, then a **linear shape** function must be used. If **nne = 3**, then a **quadratic shape** function must be used, if **nne = 4**, then a **cubic shape** function should be used.