

## Closed Methods in Finding the root of non-linear system

### 1. Bisection

- Determine  $x_m = \frac{x_l + x_u}{2}$
- Find  $f(x_l), f(x_m), f(x_u)$
- Choose new interval (*find the interval with 2 different signs (+,-)*)

Example Problem Determine the root of  $3x^4 + 7x^3 - 15x^2 + 5x = 17$  between  $[0, 2]$ . Use Bisection Method for 7 iterations. | — | — | — | — | — | — | — | —  
| | 0 | 1 | 2 |

### 1st iteration

$$x_m = \frac{x_l + x_u}{2}$$

$$= \frac{0 + 2}{2}$$

$$x_m = 1$$

$$f(x_l) = 3(0)^4 + 7(0)^3 - 15(0)^2 + 5(0) - 17$$

$$= 0 + 0 - 9 + 0 - 17$$

$$= -17$$

$$f(x_m) = 3(1)^4 + 7(1)^3 - 15(1)^2 + 5(1) - 17$$

$$= 3 + 7 - 15 + 5 - 17$$

$$= -17$$