Calcul numeric - temă de laborator

Gabriel Luican, grupa 10LD521

Februarie - Iunie 2024

Enunţ: Capitolul 10, Subcapitolul II, Problema 1

Să Sa se deduca expresia polinomului de interpolare pentru

$$f(x) = x^3 - 5x^2 + x - 1$$

$$x_i = 2i + 1,\ i \in \{0, 1, 2, 3, 4, 5\},\ z = 4$$

Soluţie

$$fct = @(x)\ x^3 - 5x^2 + x - 1$$
$$x = 2 \cdot (0 : 5) + 1;$$
$$y = fct(x);$$
$$polyLagrange(x, y)$$

$$ans = \left(s^3 - 5 * s^2 + s - 1\right)$$

$$z = z = 2 * (0 : 5) + 1$$
$$polyLagrange(x, z)$$

$$ans = \left(s\right)$$

$$syms\ s\ x$$
$$subs(z, s, x)$$

$$ans = \left([1, 3, 5, 7, 9, 11]\right)$$

Observaţii

```
>> fct = @(x) x.^3 - 5 * x.^2 + x - 1
x = 2 * (0 : 5) + 1;
y = fct(x);
polyLagrange(x,y)
```

```
fct =

  function_handle with value:

    @(x)x.^3-5*x.^2+x-1


ans =

s^3 - 5*s^2 + s - 1

>> z = 2 * (0 : 5) + 1;
polyLagrange(x, z)

ans =

s

>> syms s x
subs (z, s, x)

ans =

[1, 3, 5, 7, 9, 11]



function lag = polyLagrange(x, y)
syms s
z = poly2sym([1, 0], s);
[k, n] = size(x);
[k, m] = size(y);
if m ~= n
    disp("Data error")
    return
end
v = sym('v', [1, n]);
w = sym('w', [1, n]);
for i = 1 : n
    v(i) = sym(y(i));
end
for k = 1 : n-1
    for i = 1 : n-k
        w(i) = ((z - x(i)) *v(i + 1) - (z - x(i + k)) * v(i)) / (x(i + k) - x(i));
    end
```

```
    for i = 1 : n - k
        v(i) = w(i);
    end
end
lag = expand(v(1));
```