

Calcul numeric - temă de laborator

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Enunț: Capitolul 10, Subcapitolul I, Problema 1

Să se calculeze $L(P_n, x_0, x_1, \dots, x_n; f)(z)$ pentru

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

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

Soluție

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

$$x = 2 \cdot (0 : 5) + 1;$$

$$y = fct(x);$$

$$z = 4;$$

$$F = \text{lagrange}(z, x, y);$$

$$F = (-13.0000)$$

Observații

```
>> fct = @(x) x.^3 - 5 * x.^2 + x - 1
x = 2 * (0 : 5) + 1;
y = fct(x);
z = 4;
f = lagrange(z, x, y)
```

```
fct =
```

```
function_handle with value:
```

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

```

f =

-13.0000

function f = lagrange(xd,x,y)
[mx, nx] = size(x);
[my, ny] = size(y);
ierror = 0;
if (nx ~= ny) | (mx ~= 1) | (my ~= 1),
    ierror = 1;
    disp('data dimension error')
    abort
end
xx = sort(x);
for k = 1 : nx-1,
    if xx(k) == xx (k + 1),
        ierror = 1;
        break,
    end
end
if ierror ~= 0,
    disp('data error')
    abort
end
[m, n] = size(xd);
f = zeros(m, n);
p = zeros(m, n);
q = zeros(m, n);
w = ones(1, nx);
for i = 1 : nx,
    for j = 1 : nx,
        if i ~= j,
            w(i) = w(i) * (x(i) - x(j));
        end
    end
end
for i = 1 : m,
    for j = 1 : n,
        u = find(x == xd(i, j));
        if ~isempty(u),
            f(i, j) = y(u);
        else
            for k = 1 : nx,
                p(i, j) = p(i, j) + y(k) / (xd(i, j) - x(k)) / w(k);
                q(i, j) = q(i, j) + 1 / (xd(i, j) - x(k)) / w(k);
            end
        end
    end
end

```

```
        end
        f(i, j) = p(i, j) / q(i, j);
    end
end
end
end
```