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BSCS – 6A

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Task: 01:**Main:**

```
X = [-0.1 0.0 0.2 0.3];
Y = [5.3 2.0 3.19 1.0];
diff = div_dif(X, Y);
disp(diff);
eqn = diff_poly(1,X,Y,diff);
disp(eqn);
disp(polyval(eqn,0.1));
eqn = diff_poly(2,X,Y,diff);
disp(eqn);
disp(polyval(eqn,0.1));
eqn = diff_poly(3,X,Y,diff);
disp(eqn);
disp(polyval(eqn,0.1));
```

Function1:

```
function [diff] = div_dif(X,Y)

n = length(X);

diff = zeros(n,n);
diff(:,1) = Y';
for j=2:n,
    for k=j:n,
        diff(k,j) = (diff(k,j-1)-diff(k-1,j-1))/(X(k)-X(k-j+1));
    end
end
```

Function2:

```
function [poly] = diff_poly(n,X,Y,diff)

syms x;
poly = Y(1);
for j = 1 : n
    prod = 1;
    for k = 1 : j
        prod = prod * (x-X(k));
    end
    poly = poly + diff(j+1,j+1) * prod;
end
```

Screenshot:

```

>> main
    5.3000      0      0      0
    2.0000 -33.0000      0      0
    3.1900    5.9500 129.8333      0
    1.0000 -21.9000 -92.8333 -556.6667

2 - 33*x

-1.3000

(779*x*(x + 1/10))/6 - 33*x + 2

1.2967

(779*x*(x + 1/10))/6 - 33*x - (1670*x*(x - 1/5)*(x + 1/10))/3 + 2

2.4100

```

Task: 02

Main:

```

X = [0.1 0.3 0.5 0.7 0.9 1.1 1.3];
Y = [0.003 0.067 0.148 0.248 0.370 0.518 0.698];
diff = forward(X,Y);
eqn = simplify(forward_poly(3,X,Y,diff));
disp(diff);
disp(eqn);
disp(double(subs(eqn,0.213)));

```

Function1:

```

function [diff] = forward(X,Y)
n = length(X);
diff = zeros(n,n);
diff(:,1) = Y';
for j=2:n,
    for k=j:n,
        diff(k,j) = (diff(k,j-1)-diff(k-1,j-1));
    end
end

```

Function2:

```

function [poly] = forward_poly(n,X,Y,diff)
syms x;
poly = Y(1);
for j = 1 : n
    prod = (x - X(1))/(X(2) - X(1));
    for k = 2 : j
        prod = (prod * (prod-k+1))/k;
    end
    poly = poly + diff(j+1,j+1) * prod;
end

```

Screenshot:

```
>> main
  0.0030      0      0      0      0      0      0
  0.0670    0.0640      0      0      0      0      0
  0.1480    0.0810    0.0170      0      0      0      0
  0.2480    0.1000    0.0190    0.0020      0      0      0
  0.3700    0.1220    0.0220    0.0030    0.0010      0      0
  0.5180    0.1480    0.0260    0.0040    0.0010    0.0000      0
  0.6980    0.1800    0.0320    0.0060    0.0020    0.0010    0.0010

(5*x^4)/48 - x^3/12 + (7*x^2)/32 + (287*x)/1200 - 737/32000

0.0372
```