Element 1

```
%---------Jacobi Polynomial Evaluation----------%
% Inputs: x-coordinate, weights (alpha, beta) and order(r > 1)
% Note that r = 3 implies Jacobi Polynomials shown at orders 0,1 and 2
% Output: Jacobi Polynomial (Ps) at that x
clc
clear

% Inputs are set (can be adapted though!).....
% Weights
a=1;
b=2;
% Order and x-location
r=4;
x=0.5;

c =@(nr)nr+a+b;
Ps=zeros(1,r);

% Initialization
Ps(1,1)=1;
Ps(1,2)=0.5*(a-b)+(1+0.5*(a+b))*x;

% Recurrence formula to progress with higher orders
for s=3:r
    q=s-1;
    den=2*q*c(q)*c(2*q-2);
    num2=c(2*q-2)*c(2*q)*x+a^2-b^2;
    K1=c(2*q-1)*num2/den;
    K2=2*(q-1+a)*(q-1+b)*c(2*q)/den;
    Ps(1,s)=K1*Ps(1,s-1)-K2*Ps(1,s-2);
end

Ps=[(0:r-1)' Ps'];
disp('     Order    Jacobi Polynomial')
disp(Ps)
```

```
     Order    Jacobi Polynomial
         0    1.0000
    1.0000    0.7500
    2.0000   -0.1875
    3.0000   -0.8125
```

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