**QUESTION 1**

Use Newton’s method for following equations to find a root. You must use specific starting value.

1. F(x) = -5x4 + 11x2 – 2 x0 = 1
2. F(x) = x5 - 0,5 x0 = 1

**Solution (a):**

clear all

close all

clc

syms x;

f = @(x) (-5)\*x^4 + 11\*x^2 - 2; % Our equation

x0 = 1;

z = f(x);

diffZ = diff(z); % Derivative of f(x)

numZ = subs(z,x,x0);

denZ = subs(diffZ,x,x0);

x0 = x0 - double(numZ)/double(denZ); % Newton Raphson Formula

r = x0;

fprintf('Approximate Root is %.1f\n',r);

**Output (a):**



**Solution (b):**

clear all

close all

clc

syms x;

f = @(x) x^5 - 1/2 ; % Our equation

x0 = 1;

z = f(x);

diffZ = diff(z); % Derivative of f(x)

numZ = subs(z,x,x0);

denZ = subs(diffZ,x,x0);

x0 = x0 - double(numZ)/double(denZ); % Newton Raphson Formula

r = x0;

fprintf('Approximate Root is %.1f\n',r);

**Output (b):**



**QUESTION 2**

Find the zeros of the following Legendre Polynomials.

1. P3(x) = (5x3 – 3x)/2
2. P5(x) = (63x5 – 70x3 + 15x)/8

**Solution (a):**

clear all

close all

clc

x = -1:.002:1;

P3 = (5\*x.^3 - 3\*x)/2; % Legendre Polynomial

plot(x,ones(size(x)),x,x,x,P3)

legend('P\_0(x)','P\_1(x)','P\_3(x)','location','southeast')

grid on;

xlabel x;

ylabel y;

axis([-1 1 -1.2 1.2]);

zero\_points = [-0.77 0 0.77]

hold on

plot(zero\_points,zeros(1,3),'o','markersize',12,'linewidth',3.0);

hold off;

**Output (a):**



**Solution (b):**

clear all

close all

clc

x = -1:.002:1;

P5 = (63\*x.^5 - 70\*x.^3 + 15\*x)/8; % Legendre Polynomial

plot(x,ones(size(x)),x,x,x,P5)

legend('P\_0(x)','P\_1(x)','P\_5(x)','location','southeast')

grid on;

xlabel x;

ylabel y;

axis([-1 1 -1.2 1.2]);

zero\_points = [-0.91 -0.54 0 0.54 0.91]

hold on

plot(zero\_points,zeros(1,5),'o','markersize',12,'linewidth',3.0);

hold off;

**Output (b):**

