1. therefore, for 5 steps gives a root . To check the accuracy of root I repeated with 6 steps and 7 steps getting a root of and respectively. The root continues to switch between 1 and 2 for the last decimal places so I believe the root is correct up until that point .
2. therefore, Newton’s Method converges to the root quadratically. , theoretical value: . If rounded they match couple of decimal places .
3. therefore, for 5 steps gives a root . To check the accuracy of the root I repeated with 15 steps and 30 steps getting a root of and respectively. Knowing that the root is exactly then the root is correct up until the second decimal place…the third if rounded, .  
    therefore, Newton’s Method converges to the root linearly with a multiplicity of 5. , theoretical value: . If rounded they match a decimal place .

**newt.m** (for finding root)

function newt(f, fp, k)

g=@(x) x-f(x)/fp(x);

steps=k;

x=zeros(steps+1,1);

x(1)=0.5;

for i=1:steps

x(i+1)=g(x(i))

end

r=x(steps+1)

**newt.m** (for finding quadratic convergence)

function newt(f, fp, k)

g=@(x) x-f(x)/fp(x);

steps=k;

x=zeros(steps+1,1);

x(1)=0.5;

for i=1:steps

x(i+1)=g(x(i))

end

r=x(steps+1)

e=abs(x-r);

rat=zeros(steps+1,1);

for i=1:steps

rat(i)=e(i+1)/e(i)^2;

end

rat(steps+1)=0;

[x e rat]

**newt.m** (for finding linear convergence)

function newt(f, fp, k)

g=@(x) x-f(x)/fp(x);

steps=k;

x=zeros(steps+1,1);

x(1)=0.5;

for i=1:steps

x(i+1)=g(x(i))

end

r=x(steps+1)

e=abs(x-r);

rat=zeros(steps+1,1);

for i=1:steps

rat(i)=e(i+1)/e(i);

end

rat(steps+1)=0;

[x e rat]

**MatLab Session**

f=@(x) (432\*x.^4+72\*x.^2+16\*x+5)\*exp(1)-8\*exp(6\*x);

fp=@(x) (1728\*x.^3+144\*x+16)\*exp(1)-48\*exp(6\*x);

newt(f, fp, 5);

x =

0.500000000000000

0.478047251377279

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

r =

0.473815838069242

newt(f, fp, 6);

x =

0.500000000000000

0.478047251377279

0

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

0.473815838069241

r =

0.473815838069241

newt(f, fp, 7);

x =

0.500000000000000

0.478047251377279

0

0

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

0.473815838069241

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

0.473815838069241

0.473815838069242

r =

0.473815838069242

newt(f, fp, 5);

x =

0.500000000000000

0.478047251377279

0

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0

x =

0.500000000000000

0.478047251377279

0.473942618700500

0.473815955037586

0.473815838069341

0.473815838069242

r =

0.473815838069242

ans =

0.500000000000000 0.026184161930758 6.171746669725795

0.478047251377279 0.004231413308037 7.080794895271423

0.473942618700500 0.000126780631258 7.277170009868958

0.473815955037586 0.000000116968344 7.278903995234184

0.473815838069341 0.000000000000100 0

0.473815838069242 0 0

fpp=@(x) (5184\*x.^2+144)\*exp(1)-288\*exp(6\*x);

fpp(0.47381583806924)/(2\*fp(0.47381583806924))

ans =

7.283386597094728

f=@(x) (432\*x.^4+72\*x.^2+16\*x+3)\*exp(1)-8\*exp(6\*x);

newt(f, fp, 5);

x =

0.500000000000000

0.438579819183476

0

0

0

0

x =

0.500000000000000

0.438579819183476

0.387587511880733

0

0

0

x =

0.500000000000000

0.438579819183476

0.387587511880733

0.345586289965882

0

0

x =

0.500000000000000

0.438579819183476

0.387587511880733

0.345586289965882

0.311204672896067

0

x =

0.500000000000000

0.438579819183476

0.387587511880733

0.345586289965882

0.311204672896067

0.283196592326605

r =

0.283196592326605

newt(f, fp, 15);

x =

0.500000000000000

0.438579819183476

0

0

0

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0

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x =

0.500000000000000

0.438579819183476

0.387587511880733

0

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x =

0.500000000000000

0.438579819183476

0.387587511880733

0.345586289965882

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x =

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x =

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x =

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0.182726164066434

0.179524666382757

r =

0.179524666382757

newt(f, fp, 30);

x =

0.500000000000000

0.438579819183476

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x =

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x =

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0.242076245291962

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0.182726164066434

0.179524666382757

0.176959723446675

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x =

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0.387587511880733

0.345586289965882

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0.260467086689482

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0.186720721881015

0.182726164066434

0.179524666382757

0.176959723446675

0.174905372494976

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x =

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0.438579819183476

0.387587511880733

0.345586289965882

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0.182726164066434

0.179524666382757

0.176959723446675

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0.173260357957501

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x =

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0.387587511880733

0.345586289965882

0.311204672896067

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0.260467086689482

0.242076245291962

0.227230752530793

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0.179524666382757

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x =

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x =

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0.182726164066434

0.179524666382757

0.176959723446675

0.174905372494976

0.173260357957501

0.171943364986582

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r =

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fp(1/6)

ans =

0

fpp(1/6)

ans =

0

fppp=@(x) 10368\*x\*exp(1)-1728\*exp(6\*x);

fppp(1/6)

ans =

0

fpppp=@(x) 10368\*exp(1)-10368\*exp(6\*x);

fpppp(1/6)

ans =

0

fppppp=@(x) -62208\*exp(6\*x);

fppppp(1/6)

ans =

-1.690988759847803e+05

newt(f, fp, 30);

x =

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