$(\boldsymbol{Hw\,01\ \ Question-3})$ *for Question 5 on book*

Use the Newton's method to find solutions accurate within 10^{-4} *for following problems*

$\boldsymbol{a}.\ x^3-2x^2-5=0\ \ on\,interval[1,4]\ \ \ f(x)=x^3-2x^2-5\ \ f'(x)=3x^2-4x\ \ \epsilon=10^{-4}\ \ assume\ \ p_o=2$

$\rightarrow p_1=p_0-\frac{(f(p_0))}{(f'(p_o))}=2-\frac{(-5)}{4}=3.25\ \ |(p_1-p_0)|>\epsilon$

$\rightarrow p_2=3.25-\frac{(8.2031)}{(18.6875)}=2.811\ \ |(p_2-p_1)|>\epsilon$

$\rightarrow p_3=2.811-\frac{(1.4083)}{(12.4612)}=2.698\ \ |(p_3-p_2)|>\epsilon$

$\rightarrow p_4=2.698-\frac{(0.0809)}{(11.0456)}=2.69068\ \ |(p_4-p_3)|>\epsilon$

$\rightarrow p_5=2.691-\frac{(0.0039)}{(8.7228)}=2.69055\ \ |(p_5-p_4)|<\epsilon\ \ so\ \ the\ \ root\ \ is\,p_5=2.69055$

$\boldsymbol{b}.\ x^3+3x^2-1=0\ \ on\ \ interval\ \ [-3,-2]\ \ f(x)=x^3+3x^2-1\ \ f'(x)=3x^2-6x\ \ \epsilon=10^{-4}\ \ p_o=-3$

$\rightarrow p_1=p_0-(\frac{(f(p_0))}{(f'(p_0))})=2{,}888889\ \ |(p_1-p_0)|>\epsilon$

$\rightarrow p_2=p_1-(\frac{(f(p_1))}{(f'(p_1))})=-2.87945\ \ |(p_2-p_1)|>\epsilon$

$\rightarrow p_3=p_2-(\frac{(f(p_2))}{(f'(p_2))})=-2.87939\ \ |(p_3-p_2)|\leq\epsilon\ \ so\ \ the\ \ root\ \ is\ \ p_3=-2.87939$

$\boldsymbol{c}.\ x-\cos(x)\ \ on\ \ interval\ \ [0,\frac{\pi}{2}]\ \ f(x)=x-\cos(x)\ \ f'(x)=1+\sin(x)\ \ \epsilon=10^{-4}\ \ let's\ \ say\ \ p_0=0$

$\rightarrow p_1=p_0-(\frac{(f(p_0))}{(f'(p_0))})=1.00\ \ |(p_1-p_0)|>\epsilon$

$\rightarrow p_2=p_1-(\frac{(f(p_1))}{(f'(p_1))})=0.24964\ \ |(p_2-p_1)|>\epsilon$

$\rightarrow p_3=p_2-(\frac{(f(p_2))}{(f'(p_2))})=0.01125\ \ |(p_3-p_2)|>\epsilon$

$\rightarrow p_4=p_3-(\frac{(f(p_3))}{(f'(p_3))})=0.73909\ \ |(p_1-p_0)|\leq\epsilon\ \ so\ \ the\ \ root\ \ is\ \ p_4=0.73909$

$\boldsymbol{d}.\ x-0.8-0.2\sin(x)\ \ on\ \ interval\ \ [0,\frac{\pi}{2}]\ \ f(x)=x-0.8-0.2\sin(x)\ \ f'(x)=1-0.2\cos(x)\ \ \epsilon=10^{-4}\ \ p_o=0$

$\rightarrow p_1=p_0-(\frac{(f(p_0))}{(f'(p_0))})=1.00\ \ |(p_1-p_0)|>\epsilon$

$\rightarrow p_2=p_1-(\frac{(f(p_1))}{(f'(p_1))})=0.9645\ \ |(p_2-p_1)|>\epsilon$

$\rightarrow p_3=p_2-(\frac{(f(p_2))}{(f'(p_2))})=0.9643\ \ |(p_3-p_2)|>\epsilon$

$\rightarrow p_4=p_3-(\frac{(f(p_3))}{(f'(p_3))})=0.9643\ \ |(p_1-p_0)|\leq\epsilon\ \ so\ \ the\ \ root\ \ is\ \ p_4=0.9643$