Exercise 5

a) $f(x)=x^3-2x^2-5 \qquad [1,4]$

$f'(x)=3x^2-4x$

$p_0=3 \qquad \varepsilon = 10^{-4}$

$$p_n=p_{n-1}-\frac{f(p_{n-1})}{f'(p_{n-1})}$$

|iter|	| p0 |	| p1 |	| p1-p0 |	| f(p1) |
0	3.000000	2.733333	0.266667	0.478815
1	2.733333	2.691625	0.041709	0.010713
2	2.691625	2.690648	0.000977	0.000006
3	2.690648	2.690647	0.000001	0.000000

Found at 3 iteration

b) $f(x)=x^3+3x^2-1 \qquad [-3,-2]$

$f'(x)=3x^2+6x$

$p_0=-3 \qquad \varepsilon=10^{-4}$

$$p_n=p_{n-1}-\frac{f(p_{n-1})}{f'(p_{n-1})}$$

|iter|	| p0 |	| p1 |	| p1-p0 |	| f(p1) |
0	-3.000000	-2.888889	0.111111	-0.072702
1	-2.888889	-2.879452	0.009437	-0.000504
2	-2.879452	-2.879385	0.000066	-0.000000

Found at 2 iteration

c) $f(x)=x-\cos(x) \quad [0,\frac{\pi}{2}]$

$f'(x)=\sin(x)+1$

$p_0=0 \quad \varepsilon=10^{-4}$

$$p_n=p_{n-1}-\frac{f(p_{n-1})}{f'(p_{n-1})}$$

|iter|	| p0 |	| p1 |	| p1-p0 |	| f(p1) |
0	0.000000	1.000000	1.000000	0.459698
1	1.000000	0.750364	0.249636	0.018923
2	0.750364	0.739113	0.011251	0.000046
3	0.739113	0.739085	0.000028	0.000000

Found at 3 iteration

d) $f(x)=x-0.8-0.2\sin(x) \quad [0,\frac{\pi}{2}]$

$f'(x)=1-0.2\cos(x)$

$p_0=0 \quad \varepsilon=10^{-4}$

$$p_n=p_{n-1}-\frac{f(p_{n-1})}{f'(p_{n-1})}$$

|iter|	| p0 |	| p1 |	| p1-p0 |	| f(p1) |
0	0.000000	1.000000	1.000000	0.031706
1	1.000000	0.964453	0.035547	0.000106
2	0.964453	0.964334	0.000119	0.000000
3	0.964334	0.964334	0.000000	-0.000000

Found at 3 iteration