

# UCB Math 128A, Fall 2012: Programming Assignment 1

## Solutions

1. function [a,b]=findbracket(f,x0)

```
dx=1e-3;
a=x0;
b=x0;

while 1
    fprintf('Bracket = [%12.8f , %12.8f ]\n',a,b);
    a=a-dx;
    if f(a)*f(b)<0, break; end
    b=b+dx;
    if f(a)*f(b)<0, break; end
    dx=2*dx;
end
fprintf('Bracket = [%12.8f , %12.8f ]\n',a,b);
```

2. function p=newtonbisection(f,df,a,b,tol)

```
if f(a)*f(b)>0, error('Equal signs on brackets'); end

p=a;
fprintf(' n method      a              b              p              f(p)      \n');
fprintf('-----\n');
for n=1:100
    p=p-f(p)/df(p);
    if ~(a <= p & b >= p)
        p=(a+b)/2;
        method='Bisect';
    else
        method='Newton';
    end
    end
    if f(p)*f(b)<0
        a=p;
    else
        b=p;
    end
end

fprintf('%2d %s %12.8f %12.8f %12.8f %12.8f\n',n,method,a,b,p,f(p));
if abs(f(p))<tol, break; end
end
```

3.	n method	a	b	p	f(p)
	1 Newton	6.48627171	30.00000000	6.48627171	0.20016904
	2 Bisection	6.48627171	18.24313586	18.24313586	-0.56992952
	3 Bisection	6.48627171	12.36470379	12.36470379	-0.20030692
	4 Bisection	6.48627171	9.42548775	9.42548775	-0.00079043
	5 Newton	9.42469725	9.42548775	9.42469725	0.00000000

4.	x0	a	b	x
	-3	-7.0950	1.0950	0.58853274
	-2	-6.0950	2.0950	0.58853274
	-1	-3.0470	1.0470	0.58853274
	0	-1.0230	1.0230	0.58853274
	1	0.4890	1.2550	0.58853274
	2	-0.0470	3.0230	0.58853274
	3	2.8730	3.1270	3.09636393
	4	2.9770	4.5110	3.09636393
	5	2.9530	6.0230	3.09636393
	6	5.4890	6.5110	6.28504926
	7	5.9770	7.5110	6.28504927
	8	5.9530	9.0230	6.28504927
	9	8.4890	9.5110	9.42469725
	10	8.9770	10.5110	9.42469725