

## horner.c

```
1 #include <stdio.h>
2 #include <math.h>
3
4 #define EPS 0.00001
5
6 void horner(int n, float a[], float x0, float p[]) {
7     int i;
8     p[0] = a[n];
9     for (i = n - 1; i >= 0; i--) {
10         p[0] = a[i] + p[0] * x0;
11     }
12 }
13
14 int main(void) {
15     float a[10], p[2], x0, x1;
16     int i, n, count = 0;
17
18     printf("Enter the degree of the polynomial: ");
19     scanf("%d", &n);
20     printf("Enter the coefficients of the polynomial starting from the highest degree: ");
21     for (i = n; i >= 0; i--) {
22         scanf("%f", &a[i]);
23     }
24     printf("Enter a valid initial point x0: ");
25     scanf("%f", &x0);
26
27     horner(n, a, x0, p);
28
29     while (1) {
30         horner(n, a, x0, p);
31         if (fabs(p[1]) < EPS) {
32             printf("Derivative at current point is zero. Exiting...\n");
33             return 1;
34         }
35         x1 = x0 - (p[0] / p[1]);
36         count++;
37         if (fabs((x1 - x0) / x1) <= EPS)
38             break;
39         x0 = x1;
40     }
41     printf("The approximate root of given function %f with %d number of iterations.\n", x1,
42 count);
43     return 0;
44 }
```