

Project Name : Gonit Batayon (Horizon of Mathematics)
 Project Type : Program
 Codes Used : C++ with Standard Template Library
 Purpose : To help students in solving academic big math and big data set problems
 Project Year : 2017
 Input/Output :

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Hey, Welcome to GONIT BATAYON!
Lets start. Enjoy it

Credits: Sharif Bin Haque, Engineering University School & College, Dhaka

*****

Enter a number to get your solution:
1. Pattern
2. Profit
3. Conversations
4. Basic Fractions
5. Equation
6. The Set
7. Fundamental Statistics
8. Miscellaneous
123. Exit

Put your number (Main Menu):
2
1. Calculate for Profit (I):
2. Calculate for Principal (p):
3. Calculate for rate of interest (r):
4. Calculate for time (n):
5. Calculate for Compound Principal (C):
6. Calculate for Compound Profit (C-P):

Put a number: (type 0 to exit)
6
Calculating for Compound Profit (C-P)...
P=15000
n=5
r=9
C-P=8079.36

Put a number: (type 0 to exit)
0
Return to main menu?? Y/N
Y
Put your number (Main Menu):
6
You can enter maximum two sets:X,Y:
1. Union
2. Intersection
3. Complement
4. Number of Subsets
Enter a number: 2
First number denotes the size of the set. Then enter numbers according to the size of
the set.
X/U= 15 5 9 4 7 8 12 23 65 47 78 98 65 25 45 14
Y= 10 14 54 68 45 17 65 100 121 325 165
X intersection Y = { 14 45 65 }
Return to main menu?? Y/N
N
Thanks for being with us..
  
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```

1  #include<iostream>
2  #include<cstring>
3  #include<cmath>
4  #include<bits/stdc++.h>
5  using namespace std;
6
7  int lcm(int num1,int num2)
8  {
9      int h;
10     for (int i=num2;;i++) {
11         if (i%num1==0 && i%num2==0) {
12             h=i;
13             break;
14         }
15     }
16     return h;
17 }
18
19 int main ()
20 {
21     cout<<"Hey, Welcome to GONIT BATAYON!"<<endl;
22     cout<<"Lets start. Enjoy it"<<endl<<endl;
23     cout<<"Credits: Sharif Bin Haque, Engineering University School & College, Dhaka"<<endl<<endl;
24     cout<<"*****"<<endl<<endl;
25
26     cout<<"Enter a number to get your solution:"<<endl;
27     cout<<"1. Pattern"<<endl;
28     cout<<"2. Profit"<<endl;
29     cout<<"3. Conversations"<<endl;
30     cout<<"4. Basic Fractions"<<endl;
31     cout<<"5. Equation"<<endl;
32     cout<<"6. The Set "<<endl;
33     cout<<"7. Fundamental Statistics"<<endl;
34     cout<<"8. Miscellaneous"<<endl;
35     cout<<"123. Exit"<<endl<<endl;
36
37     while(1) {
38         int choice;
39         cout<<"Put your number (Main Menu):"<<endl;
40         cin>>choice;
41         if (choice==123) {
42             break;
43         }
44         else if (choice==1){
45             cout<<"We have some restrictions in this section"<<endl;
46             long long int a[1000],b[1000],c[1000],i,j,s,t,y,x,z,sum;
47             cout<<"How many numbers will you enter?"<<endl;
48             cin>>s;
49             cout<<"Enter them all: ";
50             for (i=0;i<s;i++) {
51                 cin>>a[i];
52             }
53             for (i=0,j=1;j<s;j++,j++) {
54                 b[i]=a[j]-a[i];
55             }
56             for (i=0,j=1;j<s-1;j++,j++) {
57                 c[i]=b[j]-b[i];
58             }
59             cout<<"How many terms of the pattern you want?"<<endl;
60             cin>>t;
61             x=a[s-1];
62             y=b[s-2];
63             z=c[s-3];
64             for(i=0;i<t;i++) {
65                 sum=x+y+z;
66                 cout<<sum<<" ";

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67         x=sum;
68         y=y+z;
69     }
70     cout<<endl<<endl;
71
72 }
73 else if (choice==2) {
74     int i,j,c;
75     double p,n,r,I;
76     cout<<"1. Calculate for Profit (I):"<<endl;
77     cout<<"2. Calculate for Principal (p):"<<endl;
78     cout<<"3. Calculate for rate of interest (r):"<<endl;
79     cout<<"4. Calculate for time (n):"<<endl;
80     cout<<"5. Calculate for Compound Principal (C):"<<endl;
81     cout<<"6. Calculate for Compound Profit (C-P):"<<endl<<endl;
82     while (1) {
83         cout<<"Put a number: (type 0 to exit)"<<endl;
84         cin>>c;
85         if (c==0) {
86             break;
87         }
88         if (c==1) {
89             cout<<"Calculating for Profit (I)..."<<endl;           //I=pnr; the formula that has used
for calculation in this section
90             cout<<"P=";
91             cin>>p;
92             cout<<"n=";
93             cin>>n;
94             cout<<"r=";
95             cin>>r;
96             cout<<"I="<<p*n*(r/100)<<endl<<endl;
97         }
98         if (c==2) {
99             cout<<"Calculating for Principal (p)..."<<endl;
100             cout<<"I=";
101             cin>>I;
102             cout<<"n=";
103             cin>>n;
104             cout<<"r=";
105             cin>>r;
106             cout<<"P="<<I/(n*(r/100))<<endl<<endl;
107         }
108         if (c==3) {
109             cout<<"Calculating for rate of interest (r)..."<<endl;
110             cout<<"I=";
111             cin>>I;
112             cout<<"n=";
113             cin>>n;
114             cout<<"p=";
115             cin>>p;
116             cout<<"R="<<(I*100)/(n*p)<<endl<<endl;
117         }
118         if (c==4) {
119             cout<<"Calculating for time (n)..."<<endl;
120             cout<<"I=";
121             cin>>I;
122             cout<<"p=";
123             cin>>p;
124             cout<<"r=";
125             cin>>r;
126             cout<<"n="<<I/(p*(r/100))<<endl<<endl;
127         }
128         if (c==5) {
129             cout<<"Calculating for Compound Principal (C)..."<<endl;   //C=P(1+r)^2
130             cout<<"P=";
131             cin>>p;

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132         cout<<"n=";
133         cin>>n;
134         cout<<"r=";
135         cin>>r;
136         cout<<"C="<<p*pow((1+(r/100)),n)<<endl<<endl;
137     }
138     if (c==6) {
139         cout<<"Calculating for Compound Profit (C-P)..."<<endl;
140         cout<<"P=";
141         cin>>p;
142         cout<<"n=";
143         cin>>n;
144         cout<<"r=";
145         cin>>r;
146         cout<<"C-P="<<p*pow((1+(r/100)),n)-p<<endl<<endl;
147     }
148 }
149 }
150 else if (choice==3) {
151     int b,len,d=0,t,len2;
152     char inp[2],out[2],ch;
153     cout<<"Press a number to enter into your preferred conversion:"<<endl<<"1.Metric"<<endl<<
"2.British"<<endl;
154     cin>>t;
155     if (t==1) {
156         char unit[]={ 'S','C','D','M','Q','H','K','L','G' };
157         double numb[]={ 0.001,0.01,0.1,1,10,100,1000,1,1 },c,a;
158         len=strlen(unit);
159         cout<<"Enter a number, its unit and the unit you want to change them into (Only Metric
units)"<<endl;
160         cout<<"Mili=S\nCenti=C\nDeci=D\nDeca=Q\nHecto=H\nKilo=K"<<endl<<"Use
M(Meter),L(Liter),G(Gram) keywords after declaring units. Such as: for Hecto Liter, Type: HL"<<endl;
161         cout<<"Type 0 S T to exit"<<endl;
162         while (1) {
163             scanf ("%lf %s %s",&a, &inp, &out);
164             ch=out[0]; //taking the first char of string
165
166             if (a==0 && inp[0]=='S' && out [0]=='T') {
167                 break;
168             }
169
170             for (b=0; b<=len; b++) { //searching for character
171                 if (inp[0]==unit[b]) {
172                     c=a*numb[b]; //converting all of them into meter unit
173                     break;
174                 }
175             }
176             switch (ch) //converting them into output (ch)
177             {
178                 case 'S':
179                     c=c*numb[6];
180                     break;
181                 case 'C':
182                     c=c*numb[5];
183                     break;
184                 case 'D':
185                     c=c*numb[4];
186                     break;
187                 case 'M':
188                     c=c*numb[3];
189                     break;
190                 case 'Q':
191                     c=c*numb[2];
192                     break;
193                 case 'H':
194                     c=c*numb[1];

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195         break;
196     case 'K':
197         c=c*numb[0];
198         break;
199     case 'L':
200         c=c*numb[7];
201         break;
202     case 'G':
203         c=c*numb[8];
204         break;
205     default :
206         printf ("Invalid\n");
207     }
208     printf ("%3lf %s = %3lf %s\n",a,inp, c,out);
209 }
210 }
211 if (t==2) {
212     char unit[]={'I','F','Y','P','M'};
213     double numb[]={1,12,36,7920,63360},c,a;
214     int numb1[]={1,12,3,220,8};
215     len=strlen(unit);
216
217     cout<<"Enter a number, its unit and the unit you want to change them into (Only British
units)"<<endl;
218
219     cout<<"I=Inch, F=Foot, Y= Yard, P=Pharlong, M=Mile"<<endl;
220     cout<<"Type 0 S T to exit"<<endl;
221     while (1) {
222         scanf ("%lf %s %s",&a, &inp, &out);
223         ch=out[0];
224
225         if (a==0 && inp[0]=='S' && out [0]=='T') {
226             break;
227         }
228
229         for (b=0; b<=len; b++) {
230             if (inp[0]==unit[b]) { // converting them into inches
231                 c=a*numb[b];
232                 break;
233             }
234         }
235         switch (ch) //dividing with their own inch value to get the output
236         {
237             case 'I':
238                 c=c/numb1[0];
239                 break;
240             case 'F':
241                 c=c/numb[1];
242                 break;
243             case 'Y':
244                 c=c/numb[2];
245                 break;
246             case 'P':
247                 c=c/numb[3];
248                 break;
249             case 'M':
250                 c=c/numb[4];
251                 break;
252             default :
253                 printf ("Invalid\n");
254         }
255         printf ("%3lf %s = %3lf %s\n",a,inp, c,out);
256     }
257 }
258 else if (choice==5) {
259     int i,t;

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260     cout<<"1. Simple Equation"<<endl<<"2. Quardatric Equation " <<endl<<"Enter a number: ";
261     cin>>t;
262     if (t==1) {
263         float a,b,c;
264         char ch,dh;
265         cout<<"Calculating for function 1..."<<endl;
266         cout<<"Enter a equation, like: 2x+1=5"<<endl;
267         scanf ("%f%c%c%f=%f",&a,&dh,&ch,&b,&c);
268         switch (ch) //determining the arithmatical sign
269         {
270             case '+':
271                 c=c-b;
272                 break;
273             case '-':
274                 c=c+b;
275                 break;
276             case '*':
277                 c=c/b;
278                 break;
279             case '/':
280                 c=c*b;
281                 break;
282         }
283         printf ("%c = %0.2f\n",dh,c/a);
284     }
285     if (t==2) {
286         long long int a,b,c,e,f,g,l,m,n;
287         char ch,dh,eh,fh;
288         float x,y;
289
290         cout<<"Enter the equations: " <<endl<<endl<<"1. ";
291         scanf ("%d%c %d%c = %d",&a,&ch,&b,&dh,&c);
292         cout<<"2. ";
293         scanf ("%d%c %d%c = %d",&e,&eh,&f,&fh,&g);
294
295         y=(c*e-g*a)/(b*e-f*a);
296         x=(c-(b*y))/a;
297         cout<<"Solving for (x,y).."<<endl;
298         cout<<"(x,y) = ("<<x<<","<<y<<)"<<endl;
299     }
300 }
301 else if (choice==6) {
302     cout<<"You can enter maximum two sets: X,Y:"<<endl;
303     cout<<"1. Union"<<endl<<"2. Intersection"<<endl<<"3. Complement"<<endl<<"4. Number of Subsets"
<<endl;
304     cout<<"Enter a number: ";
305     int t;
306     cin>>t;
307
308     cout<<"First number denotes the size of the set. Then enter numbers according to the size of
the set."<<endl;
309     int a[100],b[100],i,j,h=0,c=0,ans[1000];
310     int x,y;
311     cout<<"X/U= ";
312     cin>>x;
313     for (i=0;i<x;i++) {
314         cin>>a[i];
315     }
316     cout<<"Y= ";
317     cin>>y; //denotes the size of array
318     for (i=0;i<y;i++) {
319         cin>>b[i];
320     }
321     if (t==1) {
322         cout<<"X union Y = { ";
323         for (i=0;i<y;i++) {

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```

324         for (j=0;j<x;j++) {
325             if (b[i]==a[j]) {
326                 h=1;
327             }
328         }
329         if (h==0) {
330             cout<<b[i]<<" "; //if h==1, that means that the number is common in those
arrays
331         }
332         h=0;
333     }
334     for (i=0;i<x;i++) {
335         cout<<a[i]<<" ";
336     }
337     cout<<" "<<endl;
338 }
339 if (t==2) {
340     cout<<"X intersection Y = { ";
341     for (i=0;i<y;i++) {
342         for (j=0;j<x;j++) {
343             if (b[i]==a[j]) { //only commons will be printed
344                 h=1;
345             }
346         }
347         if (h==1) {
348             cout<<b[i]<<" ";
349         }
350         h=0;
351     }
352     cout<<" "<<endl;
353 }
354 if (t==3) {
355     cout<<"Complement Y = { ";
356     for (i=0;i<x;i++) {
357         for (j=0;j<y;j++) {
358             if (b[j]==a[i]) {
359                 h=1;
360             }
361         }
362         if (h==0) {
363             cout<<a[i]<<" ";
364         }
365         h=0;
366     }
367     cout<<" "<<endl;
368 }
369 }
370 else if (choice==4) {
371     cout<<"Enter two simple fractions in this format: A/B-C/D or A/B+C/D"<<endl;
372     long long int a,b,c,d,e,f,i,j,l,n;
373     scanf("%lld/%lld %lld/%lld",&a,&b,&c,&d);
374     l=lcm(b,d);
375
376     a=(l/b)*a;
377     c=(l/d)*c;
378
379     e=a+c;
380     f=1;
381     n=(e>f)? f:e;
382     while (n--) {
383         if (e%n==0 && f%n==0) {
384             e=e/n;
385             f=f/n;
386         }
387         if (n==2) {
388             break;

```

```

389     }
390 }
391 cout<<"Simple Fraction is: ";
392 cout<<e<<"/"<<f<<endl;
393 }
394 else if (choice==7) {
395     cout<<"1.Sorting in Ascending"<<endl<<"2.Sorting in Descending"<<endl<<"3.Calculate Average"<<
endl;
396     cout<<"4. Calculate Mode"<<endl<<"5.Calculate Median"<<endl;
397     int t,i,s;
398     cin>>t;
399     cout<<"Enter the size of array:"<<endl;
400     cin>>s;
401     cout<<"Enter elements:"<<endl;
402     int arr[s];
403     for (i=0;i<s;i++) {
404         cin>>arr[i];
405     }
406     if (t==1) {
407         sort(arr,arr+s);
408         cout<<"Sorting in ascending..."<<endl;
409         for (i=0;i<s;i++) {
410             cout<<arr[i]<<" ";
411         }
412         cout<<endl;
413     }
414     if (t==2) {
415         sort(arr,arr+s,greater<int>());
416         cout<<"Sorting in descending..."<<endl;
417         for (i=0;i<s;i++) {
418             cout<<arr[i]<<" ";
419         }
420         cout<<endl;
421     }
422     if (t==3) {
423         long long int c=0;
424         for (i=0;i<s;i++) {
425             c=c+arr[i];
426         }
427         cout<<"Average is : "<<c/s<<endl;
428     }
429     if (t==4) {
430         int i,j,k,h=0,n,x;
431         int c[s];
432
433         for (i=0;i<s;i++) {
434             c[i]=0;
435             for (j=0;j<s;j++) {
436                 if (arr[i]==arr[j]) { //c array denotes how many times the number exists in the
array
437                     c[i]++;
438                 }
439             }
440             h=(h<c[i])? c[i]:h; //highest number
441         }
442         for (i=0;i<s;i++) {
443             if (c[i]==h) {
444                 cout<<"Mode is: "<<arr[i]<<" "<<(" "<<h<<"times");
445                 break;
446             }
447         }
448         cout<<endl;
449     }
450     if (t==5) {
451         int i,s;
452         double n,a,b;

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```

453         sort(arr,arr+s);
454         if (s%2!=0) {
455             cout<<arr[((s+1)/2)-1]<<endl;
456         }
457         if (s%2==0) {
458             a=arr[s/2-1];
459             b=arr[(s/2)+1-1];
460             n=(a+b)/2;
461             cout<<"Median is: "<<n<<endl;
462         }
463     }
464 }
465 else if (choice==8) {
466     cout<<"1. LCM"<<endl;
467     cout<<"2. GCD"<<endl;
468     cout<<"3. Calculator"<<endl;
469     cout<<"Enter your choice:"<<endl;
470     int t;
471     cin>>t;
472     if (t==1) {
473         int x,y;
474         cout<<"Enter value for X then Y:"<<endl;
475         cin>>x>>y;
476         cout<<"LCM= "<<lcm(x,y)<<endl;
477     }
478     if (t==2) {
479         int x,y;
480         cout<<"Enter value for X then Y:"<<endl;
481         cin>>x>>y;
482         cout<<"GCD"<<(x*y)/(lcm(x,y))<<endl;
483     }
484     if (t==3) {
485         cout<<"Enter value for X then Y (Only Basic Arithmetic sign calculations are availble
486 here):"<<endl;
487         cout<<"Press 0/0 to exit"<<endl;
488         while (1) {
489             double x,y;
490             char ch;
491             cin>>x;
492             cin>>ch;
493             cin>>y;
494             if (x==0 && y==0) {
495                 break;
496             }
497             else if (ch=='+') {
498                 cout<<"= "<<x+y<<endl;
499             }
500             else if (ch=='-') {
501                 cout<<"= "<<x-y<<endl;
502             }
503             else if (ch=='*') {
504                 cout<<"= "<<x*y<<endl;
505             }
506             else if (ch=='/') {
507                 cout<<"= "<<x/y<<endl;
508             }
509             else {
510                 cout<<"This operation isn't available here. Please go through your Windows
511 Calculator."<<endl;
512             }
513         }
514     }
515     cout<<"Return to main menu?? Y/N"<<endl;
516     char ch;
517     cin>>ch;

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```
517
518     if (ch=='Y'){
519         continue;
520     }
521     else {
522         cout<<"Thanks for being with us.."<<endl;
523         break;
524     }
525 }
526 return 0;
527 }
```