

# **LAPORAN TUGAS KECIL**

## **IF2211 Strategi Algoritma**



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## A. Algoritma Brute Force

Algoritma brute force adalah sebuah pendekatan yang lempang/mudah (straightforward ) untuk memecahkan suatu persoalan, algoritma ini biasanya didasarkan langsung pada pernyataan suatu masalah. Algoritma ini akan meninjau semua kemungkinan kasus yang muncul kemudian memilih kasus yang diinginkan program. Algoritma ini memiliki banyak cara yang berbeda dalam menyelesaikan suatu persoalan. Hal ini dikarenakan pendekatan yang berbeda dalam mengerjakan persoalan tersebut, optimisasi , dan cara membuang kasus yang tidak perlu.

Untuk persoalan tugas kecil 1 yaitu 24 solver diminta menggunakan algoritma *brute force*. Berikut langkah-langkah algoritma yang dibuat.

1. Pertama program akan meminta input untuk memilih apakah pengguna ingin menginput 4 kartu atau random kartu. Input pengguna divalidasi oleh program. Kartu ini terdiri dari A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, seperti kartu remi. Keempat kartu inilah yang akan dihitung semua solusi dengan mengkombinasikan 4 operator yang ada (+, -, \*, /) yang menghasilkan nilai 24.
2. Selanjutnya kita mengevaluasi semua kemungkinan yang ada dari tiap 4 angka tadi dan operator. Kita akan menggunakan permutasi untuk mengubah urutan 4 angka dan mengkombinasikan semua operator yang mungkin. Kita juga akan membuat 5 kemungkinan urutan kurung yang berbeda yaitu :
  - a. (Num1 OP1 Num2) OP2 (Num3 OP3 Num4)
  - b. ((Num1 OP1 Num2) OP2 Num3) OP3 Num4
  - c. (Num1 OP1 (Num2 OP2 Num3)) OP3 Num4
  - d. Num1 OP1 (Num2 OP2 (Num3 OP3 Num4))
  - e. Num1 OP1 ((Num2 OP2 Num3) OP3 Num4)

Algoritma yang digunakan yaitu looping sebanyak  $24 \times 4 \times 4 \times 4 \times 5$  loop ke semua kombinasi hasil permutasi, yaitu 24 kemungkinan. Kemudian karena ada 4 kemungkinan operator dan 3 kali menggunakan operator maka dilakukan loop  $4 \times 4 \times 4$ . Kemudian dari semua kemungkinan tadi dengan akan digunakan 5 kasus kurung sebelumnya, kemudian akan didapat hasil dari algoritma brute force tersebut.

3. Kemudian akan ada kemungkinan bahwa 4 kartu yang diinput di awal sama, misal “10 K 6 6” kita harus menghapus hasil yang sama, misal “ $(10 + K) + (6 / 6)$ ” dengan “ $(10 + K) + (6 / 6)$ ”, karena solusi tersebut sama maka dianggap 1 solusi saja. Untuk itu, digunakan struktur data set agar tidak ada data yang terduplikasi.
4. Setelah semua solusi dimasukkan ke dalam set, ditampilkan banyaknya, dan solusi itu sendiri, dan juga waktu eksekusinya ke layar untuk ditampilkan.
5. Pengguna dapat memilih untuk melakukan save dalam bentuk (filename).txt

## B. Source Program

```
1  #include <iostream>
2  #include <stdio.h>
3  #include <vector>
4  #include <string>
5  #include <set>
6  #include <fstream>
7  #include <time.h>
8  #include <windows.h>
9
10 using namespace std;
11 set<string> result; //set untuk menghilangkan data yang terduplikasi
12
13 bool validateInput(string x){//validasi input 4 kartu user
14
15     if (x.compare("A") == 0){
16         return true;
17     }
18     if (x.compare("2") == 0){
19         return true;
20     }
21     if (x.compare("3") == 0){
22         return true;
23     }
24     if (x.compare("4") == 0){
25         return true;
26     }
27     if (x.compare("5") == 0){
28         return true;
29     }
30     if (x.compare("6") == 0){
31         return true;
32     }
33     if (x.compare("7") == 0){
34         return true;
35     }
36     if (x.compare("8") == 0){
37         return true;
38     }
39     if (x.compare("9") == 0){
40         return true;
41     }
42     if (x.compare("10") == 0){
43         return true;
44     }
45     if (x.compare("J") == 0){
46         return true;
47     }
48     if (x.compare("Q") == 0){
49         return true;
50     }
51     if (x.compare("K") == 0){
52         return true;
53     }
54
55     return false;
56 }
57
```

```

58 float remitofloat(string x){//Mengubah string remi ke angka float
59     if (x.compare("A") == 0){
60         return 1;
61     }
62     if (x.compare("2") == 0){
63         return 2;
64     }
65     if (x.compare("3") == 0){
66         return 3;
67     }
68     if (x.compare("4") == 0){
69         return 4;
70     }
71     if (x.compare("5") == 0){
72         return 5;
73     }
74     if (x.compare("6") == 0){
75         return 6;
76     }
77     if (x.compare("7") == 0){
78         return 7;
79     }
80     if (x.compare("8") == 0){
81         return 8;
82     }
83     if (x.compare("9") == 0){
84         return 9;
85     }
86     if (x.compare("10") == 0){
87         return 10;
88     }
89     if (x.compare("J") == 0){
90         return 11;
91     }
92     if (x.compare("Q") == 0){
93         return 12;
94     }
95     if (x.compare("K") == 0){
96         return 13;
97     }
98
99     return 0;
100 }

```

```

102 string floattoremi(float x)//Merubah angka float ke string remi
103 {
104     if (x == 1){
105         return "A";
106     }
107     if (x == 2){
108         return "2";
109     }
110     if (x == 3){
111         return "3";
112     }
113     if (x == 4){
114         return "4";
115     }
116     if (x == 5){
117         return "5";
118     }
119     if (x == 6){
120         return "6";
121     }
122     if (x == 7){
123         return "7";
124     }
125     if (x == 8){
126         return "8";
127     }
128     if (x == 9){
129         return "9";
130     }
131     if (x == 10){
132         return "10";
133     }
134     if (x == 11){
135         return "J";
136     }
137     if (x == 12){
138         return "Q";
139     }
140     if (x == 13){
141         return "K";
142     }
143
144     return " ";
145 }

```

```

147 | string floattoString(float x) //Merubah angka float ke tipe string angka
148 | {
149 |     if (x == 1){
150 |         return "1";
151 |     }
152 |     if (x == 2){
153 |         return "2";
154 |     }
155 |     if (x == 3){
156 |         return "3";
157 |     }
158 |     if (x == 4){
159 |         return "4";
160 |     }
161 |     if (x == 5){
162 |         return "5";
163 |     }
164 |     if (x == 6){
165 |         return "6";
166 |     }
167 |     if (x == 7){
168 |         return "7";
169 |     }
170 |     if (x == 8){
171 |         return "8";
172 |     }
173 |     if (x == 9){
174 |         return "9";
175 |     }
176 |     if (x == 10){
177 |         return "10";
178 |     }
179 |     if (x == 11){
180 |         return "11";
181 |     }
182 |     if (x == 12){
183 |         return "12";
184 |     }
185 |     if (x == 13){
186 |         return "13";
187 |     }
188 |
189 |     return " ";
190 | }

```

```

147 | string floattoString(float x) //Merubah angka float ke tipe string angka
148 | {
149 |     if (x == 1){
150 |         return "1";
151 |     }
152 |     if (x == 2){
153 |         return "2";
154 |     }
155 |     if (x == 3){
156 |         return "3";
157 |     }
158 |     if (x == 4){
159 |         return "4";
160 |     }
161 |     if (x == 5){
162 |         return "5";
163 |     }
164 |     if (x == 6){
165 |         return "6";
166 |     }
167 |     if (x == 7){
168 |         return "7";
169 |     }
170 |     if (x == 8){
171 |         return "8";
172 |     }
173 |     if (x == 9){
174 |         return "9";
175 |     }
176 |     if (x == 10){
177 |         return "10";
178 |     }
179 |     if (x == 11){
180 |         return "11";
181 |     }
182 |     if (x == 12){
183 |         return "12";
184 |     }
185 |     if (x == 13){
186 |         return "13";
187 |     }
188 |
189 |     return " ";
190 | }
191 |
192 | vector<float> randomNumber()//Menghasilkan 4 random number
193 | {
194 |     vector<float> inputR;
195 |     int lb = 1, ub = 13;
196 |     float a;
197 |     int i;
198 |
199 |     srand(time(0));
200 |     for (i=0;i<4;i++){
201 |         inputR.push_back((rand() % (ub - lb + 1)) + lb);
202 |     }
203 |     return inputR;
204 | }

```

```

void swapFloat(int x, float *a, float *b, float *c, float *d, float p, float q, float r, float s)
> //Permutasi merubah posisi a b c d...

float calculate(char op1, float num1, float num2){ //melakukan penghitungan
    switch (op1) {
        case '+':
            return num1+num2;
        case '-':
            return num1-num2;
        case '*':
            return num1*num2;
        case '/':
            return num1/num2;
    }

    return 0;
}

void way1(float a, float b, float c, float d, char op1[4]) { // Menghitung (num1 op1 num2) op2 (num3 op3 num4)
    float temp1, temp2, temp3;
    int i;
    string Str1, Str2, Str3, Str4, Str5, Str6, Str7;
    float p, q, r, s;
    p=a;
    q=b;
    r=c;
    s=d;
    for (i=0; i<24; i++) {
        swapFloat(i, &a, &b, &c, &d, p, q, r, s);
        for (int i=0; i<4; i++) {
            for (int j=0; j<4; j++) {
                for (int k=0; k<4; k++) {

                    temp1 = calculate(op1[i], a, b);
                    temp2 = calculate(op1[k], c, d);
                    temp3 = calculate(op1[j], temp1, temp2);

                    if (24-temp3 <= 0.000001 && 24-temp3 >= -0.000001){
                        Str1=floattoString(a);
                        Str2=op1[i];
                        Str3=floattoString(b);
                        Str4=op1[j];
                        Str5=floattoString(c);
                        Str6=op1[k];
                        Str7=floattoString(d);
                        result.insert("(" + Str1 + Str2 + Str3 + ")" + Str4 + "(" + Str5 + Str6 + Str7 + ")");
                    }
                }
            }
        }
    }
}

```

```

457 void way2(float a,float b,float c,float d,char op1[4]) { //Menghitung ((num1 op1 num2) op2 num3) op3 num4
458     float temp1, temp2, temp3;
459     int i;
460     string Str1,Str2,Str3,Str4,Str5,Str6,Str7;
461     float p,q,r,s;
462     p=a;
463     q=b;
464     r=c;
465     s=d;
466     for (i=0;i<24;i++) {
467         swapFloat(i,&a,&b,&c,&d,p,q,r,s);
468         for (int i=0;i<4;i++) {
469             for (int j=0;j<4;j++) {
470                 for (int k=0;k<4;k++) {
471                     temp1 = calculate(op1[i],a,b);
472                     temp2 = calculate(op1[j],temp1,c);
473                     temp3 = calculate(op1[k],temp2,d);
474                     //cout<<"way1 --"<<ops[i]<<" "<<ops[j]<<" "<<ops[k]<<" "<<temp1<<" "<<temp2<<" "<<temp3<<"\n";
475                     if (24-temp3 <= 0.000001 && 24-temp3 >= -0.000001){
476                         Str1=floattoString(a);
477                         Str2=op1[i];
478                         Str3=floattoString(b);
479                         Str4=op1[j];
480                         Str5=floattoString(c);
481                         Str6=op1[k];
482                         Str7=floattoString(d);
483                         result.insert("(" + Str1 + Str2 + Str3 + ")" + Str4 + Str5 + ")" + Str6 + Str7 + ")");
484                     }
485                 }
486             }
487         }
488     }
489 }
490 void way3(float a,float b,float c,float d,char op1[4]) { //Menghitung (num1 op1 (num2 op2 num3)) op3 num4
491     float temp1, temp2, temp3;
492     int i;
493     string Str1,Str2,Str3,Str4,Str5,Str6,Str7;
494     float p,q,r,s;
495     p=a;
496     q=b;
497     r=c;
498     s=d;
499     for (i=0;i<24;i++) {
500         swapFloat(i,&a,&b,&c,&d,p,q,r,s);
501         for (int i=0;i<4;i++) {
502             for (int j=0;j<4;j++) {
503                 for (int k=0;k<4;k++) {
504                     temp1 = calculate(op1[j],b,c);
505                     temp2 = calculate(op1[i],a,temp1);
506                     temp3 = calculate(op1[k],temp2,d);
507                     //cout<<"way1 --"<<ops[i]<<" "<<ops[j]<<" "<<ops[k]<<" "<<temp1<<" "<<temp2<<" "<<temp3<<"\n";
508                     if (24-temp3 <= 0.000001 && 24-temp3 >= -0.000001){
509                         Str1=floattoString(a);
510                         Str2=op1[i];
511                         Str3=floattoString(b);
512                         Str4=op1[j];
513                         Str5=floattoString(c);
514                         Str6=op1[k];
515                         Str7=floattoString(d);
516                         result.insert("(" + Str1 + Str2 + "(" + Str3 + Str4 + Str5 + ")") + Str6 + Str7 + ")");
517                     }
518                 }
519             }
520         }
521     }
522 }
523 }
524 }
525 }
526 }
527 }

```

```

529 void way4(float a,float b,float c,float d,char op1[4]) { //Menghitung num1 op1 (num2 op2 num3) op3 num4
530     float temp1, temp2, temp3;
531     int i;
532     string Str1,Str2,Str3,Str4,Str5,Str6,Str7;
533     float p,q,r,s;
534     p=a;
535     q=b;
536     r=c;
537     s=d;
538     for (i=0;i<24;i++) {
539         swapFloat(i,&a,&b,&c,&d,p,q,r,s);
540         for (int i=0;i<4;i++) {
541             for (int j=0;j<4;j++) {
542                 for (int k=0;k<4;k++) {
543                     temp1 = calculate(op1[j],b,c);
544                     temp2 = calculate(op1[i],temp1,d);
545                     temp3 = calculate(op1[k],temp2,d);
546                     if (24-temp3 <= 0.000001 && 24-temp3 >= -0.000001){
547                         Str1=floattoString(a);
548                         Str2=op1[i];
549                         Str3=floattoString(b);
550                         Str4=op1[j];
551                         Str5=floattoString(c);
552                         Str6=op1[k];
553                         Str7=floattoString(d);
554                         result.insert("(" + Str1 + Str2 + "(" + Str3 + Str4 + Str5 + ")" + Str6 + Str7 + ")");
555                     }
556                 }
557             }
558         }
559     }
560 }

561
562 void way5(float a,float b,float c,float d,char op1[4]) { //Menghitung num1 op1 (num2 op2 (num3 op3 num4))
563     float temp1, temp2, temp3;
564     int i;
565     string Str1,Str2,Str3,Str4,Str5,Str6,Str7;
566     float p,q,r,s;
567     p=a;
568     q=b;
569     r=c;
570     s=d;
571     for (i=0;i<24;i++) {
572         swapFloat(i,&a,&b,&c,&d,p,q,r,s);
573         for (int i=0;i<4;i++) {
574             for (int j=0;j<4;j++) {
575                 for (int k=0;k<4;k++) {
576                     temp1 = calculate(op1[k],c,d);
577                     temp2 = calculate(op1[j],b,temp1);
578                     temp3 = calculate(op1[i],a,temp2);
579                     if (24-temp3 <= 0.000001 && 24-temp3 >= -0.000001){
580                         Str1=floattoString(a);
581                         Str2=op1[i];
582                         Str3=floattoString(b);
583                         Str4=op1[j];
584                         Str5=floattoString(c);
585                         Str6=op1[k];
586                         Str7=floattoString(d);
587                         result.insert("(" + Str1 + Str2 + "(" + Str3 + Str4 + "(" + Str5 + Str6 + Str7 + ")"));
588                     }
589                 }
590             }
591         }
592     }
593 }
594

```



```

595 void splashScreen(){//splashscreen
596     cout << "
597     cout << "
598     cout << "
599     cout << "
600     cout << "
601     cout << "
602     cout << "
603     cout << "
604     cout << "
605     cout << "
606     cout << "
607
608 }
609
610 void startProg(){//start/exit program
611     bool temp=false;
612     string choicetemp;
613     while (!temp){
614
615         cout << "-----[START/EXIT]----- \n";
616         cout << "[1].Start\n";
617         cout << "[2].Exit\n";
618         cout << "Input : " ;cin >> choicetemp;
619         if (choicetemp.compare("1") == 0 || choicetemp.compare("2") == 0){
620             break;
621         }
622
623         if (!temp)
624         {
625             printf("\n ----- invalid input -----");
626             printf("\n ----- press enter to continue ----- \n ");
627             cin.get();
628             cin.get();
629             system("cls");
630         }
631
632     }
633     if (choicetemp.compare("1") == 0){
634         ="";
635     }
636     else if (choicetemp.compare("2") == 0){
637         exit(0);
638     }
639 }

```

```

641 int main()
642 {
643     vector<float> InputK;
644     char op1[4]={'+', '-', '*', '/'};
645     float a,b,c,d;
646     float count;
647     bool cek1=false;
648     bool cek2=false;
649     bool cek3=false;
650     bool cek4=false;
651     bool isValid=false;
652     time_t start, end;
653     int i,j,k;
654     string a1,b1,c1,d1;
655     string choice;
656     string save;
657     count=0;
658
659     splashScreen();
660     startProg();
661     while (!isValid){
662
663         cout << "=====Pilih Cara Input===== \n";
664         cout << "[1].Random\n";
665         cout << "[2].Input User\n";
666         cout << "Input : " ;cin >> choice;
667         if (choice.compare("1") == 0 || choice.compare("2") == 0){
668             break;
669         }
670
671         if (!isValid)
672         {
673             printf("\n ----- invalid input -----");
674             printf("\n ----- press enter to continue ----- \n ");
675             cin.get();
676             cin.get();
677             system("cls");
678         }
679
680     }
681
682     if (choice.compare("2") == 0){
683         while (!cek1 || !cek2 || !cek3 || !cek4 ){
684             cout << "\nKartu hanya bisa digunakan sekali! \n";
685             cout << "Input {A,1,2,3,4,5,6,7,8,9,10,J,Q,K} : \n";
686             cout << "1. ";
687             cin >> a1;
688             cout << "2. ";
689             cin >> b1;
690             cout << "3. ";
691             cin >> c1;
692             cout << "4. ";
693             cin >> d1;
694             cek1 = validateInput(a1);
695             cek2 = validateInput(b1);
696             cek3 = validateInput(c1);
697             cek4 = validateInput(d1);
698             if (cek1 == false || cek2 == false || cek3 == false || cek4==false)
699             {
700                 printf("\n ----- Masukan tidak sesuai -----");
701                 printf("\n ----- press enter to continue ----- \n ");
702                 cin.get();
703                 cin.get();
704                 system("cls");
705             }
706         }

```

```

707     a=remitofloat(a1);
708     b=remitofloat(b1);
709     c=remitofloat(c1);
710     d=remitofloat(d1);
711 }else {
712
713     inputK=randomNumber();
714     a=inputK[0];
715     b=inputK[1];
716     c=inputK[2];
717     d=inputK[3];
718     a1=floattoremi(a);
719     b1=floattoremi(b);
720     c1=floattoremi(c);
721     d1=floattoremi(d);
722 }
723
724 start = clock();
725
726 way1(a,b,c,d,op1);
727 way2(a,b,c,d,op1);
728 way3(a,b,c,d,op1);
729 way4(a,b,c,d,op1);
730 way5(a,b,c,d,op1);
731
732 cout << a1 << " " << b1 << " " << c1 << " " << d1 << endl;
733
734 for (auto j = result.begin(); j != result.end(); ++j){
735     count++;
736 }
737
738 if (count>0){
739     cout << count << " Solutions found\n";
740 }else{
741     cout << "Tidak ada solusi\n";
742 }
743
744 count=0;
745 for (auto j = result.begin(); j != result.end(); ++j){
746     count++;
747     cout << count << ". " << *j << "\n";
748 }
749
750 end = clock();
751
752 double duration_sec = double(end-start)/CLOCKS_PER_SEC*1000;
753
754 cout << "Execution Time : " << duration_sec << " ms\n";
755
756 while (!isValid){
757     cout << "Apakah ingin menyimpan solusi ? (Y/N) : ";
758     cin >> save;
759     if (save.compare("Y") == 0 || save.compare("N") == 0){
760         break;
761     }
762     if (!isValid)
763     {
764         printf("\n ===== invalid input =====");
765         printf("\n ----- press enter to continue ----- \n ");
766         cin.get();
767         cin.get();
768         system("cls");
769     }
770 }
771
772 if (save.compare("Y") == 0){
773     ofstream File("output.txt");
774     File << a1 << " " << b1 << " " << c1 << " " << d1 << endl;
775     File << count << " Solutions\n";
776     for (auto j = result.begin(); j != result.end(); ++j){
777         // cout << *j << "\n";
778         File << *j << "\n";
779     }
780     File.close();
781 }
782
783

```

## C. Input dan Output

### 1. Testcase 1 (A J Q K) (testcase1.txt)

```

=====[START/EXIT]=====
[1].Start
[2].Exit
Input : 1
=====Pilih Cara Input=====
[1].Random
[2].Input User
Input : 2

Kartu hanya bisa digunakan sekali!
Input {A,1,2,3,4,5,6,7,8,9,10,J,Q,K} :
1. A
2. J
3. Q
4. K
A J Q K
32 Solutions found

```

1.	$((1*13)-11)*12$
2.	$((13*1)-11)*12$
3.	$((13-11)*1)*12$
4.	$((13-11)*12)*1$
5.	$((13-11)*12)/1$
6.	$((13-11)/1)*12$
7.	$((13/1)-11)*12$
8.	$1*(12*(13-11))$
9.	$1*(13-11)*12$
10.	$1*(13-11)*12$
11.	$1*12*(13-11)$
12.	$12*(1*(13-11))$
13.	$12*(1*13)-11$
14.	$12*(13*1)-11$
15.	$12*(13-(1*11))$
16.	$12*(13-(11*1))$
17.	$12*(13-(11/1))$
18.	$12*(13-11)*1$
19.	$12*(13-11)/1$
20.	$12*(13-11)*1$
21.	$12*(13-11)/1$
22.	$12*(13/1)-11$
23.	$12*1*(13-11)$
24.	$12/(1/(13-11))$
25.	$12/1*(13-11)$
26.	$13-(1*11)*12$
27.	$13-(11*1)*12$
28.	$13-(11/1)*12$
29.	$(13-11)*(1*12)$
30.	$(13-11)*(12*1)$
31.	$(13-11)*(12/1)$
32.	$(13-11)/(1/12)$

Execution Time : 12 ms  
Apakah ingin menyimpan solusi ? (Y/N) : Y

1	A J Q K
2	32 Solutions
3	$((1*13)-11)*12$
4	$((13*1)-11)*12$
5	$((13-11)*1)*12$
6	$((13-11)*12)*1$
7	$((13-11)*12)/1$
8	$((13-11)/1)*12$
9	$((13/1)-11)*12$
10	$1*(12*(13-11))$
11	$1*(13-11)*12$
12	$1*(13-11)*12$
13	$1*12*(13-11)$
14	$12*(1*(13-11))$
15	$12*(1*13)-11$
16	$12*(13*1)-11$
17	$12*(13-(1*11))$
18	$12*(13-(11*1))$
19	$12*(13-(11/1))$
20	$12*(13-11)*1$
21	$12*(13-11)/1$
22	$12*(13-11)*1$
23	$12*(13-11)/1$
24	$12*(13/1)-11$
25	$12*1*(13-11)$
26	$12/(1/(13-11))$
27	$12/1*(13-11)$
28	$13-(1*11)*12$
29	$13-(11*1)*12$
30	$13-(11/1)*12$
31	$(13-11)*(1*12)$
32	$(13-11)*(12*1)$
33	$(13-11)*(12/1)$
34	$(13-11)/(1/12)$

## 2. Testcase 2 (6 6 6 6) (testcase2.txt)

```
===== [START/EXIT] =====
[1].Start
[2].Exit
Input : 1
=====Pilih Cara Input=====
[1].Random
[2].Input User
Input : 2

Kartu hanya bisa digunakan sekali!
Input {A,1,2,3,4,5,6,7,8,9,10,J,Q,K} :
1. 6
2. 6
3. 6
4. 6
6 6 6 6
7 Solutions found
1. ((6*6)-6)-6)
2. ((6+6)+6)+6)
3. (6*6)-(6+6)
4. (6+(6+(6+6)))
5. (6+(6+6))+6)
6. (6+(6+6)+6))
7. (6+6)+(6+6)
Execution Time : 2 ms
Apakah ingin menyimpan solusi ? (Y/N) : Y
Input nama file : testcase2

Tucil1Stima > test > testcase2.txt
1 6 6 6 6
2 7 Solutions
3 ((6*6)-6)-6)
4 ((6+6)+6)+6)
5 (6*6)-(6+6)
6 (6+(6+(6+6)))
7 (6+(6+6))+6)
8 (6+(6+6)+6))
9 (6+6)+(6+6)
10
```

## 3. Testcase 3 Random (A 10 K 9) (testcase3.txt)

```
PS C:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA> cd "c:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1Stima\src\" ; if ($?) { g++ main.cpp -o main } ; if ($?) { .\main }

===== [START/EXIT] =====
[1].Start
[2].Exit
Input : 1
=====Pilih Cara Input=====
[1].Random
[2].Input User
Input : 1
A 10 K 9
4 Solutions found
1. (1-9)*(10-13)
2. (10-13)*(1-9)
3. (13-10)*(9-1)
4. (9-1)*(13-10)
Execution Time : 1 ms
Apakah ingin menyimpan solusi ? (Y/N) : Y
Input nama file : testcase3
PS C:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1Stima\src>
```

```
Tucil1Stima > test > testcase3.txt
```

```
1 A 10 K 9
2 4 Solutions
3 (1-9)*(10-13)
4 (10-13)*(1-9)
5 (13-10)*(9-1)
6 (9-1)*(13-10)
7
```

#### 4. Testcase 4 Random (3 3 6 A) (testcase4.txt)

```
PS C:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1Stima\src> cd "c:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1Stima\src\" ; if ($?) { g++ main.cpp -o main } ; if ($?) { .\main }
```



```
-----[START/EXIT]-----
[1].Start
[2].Exit
Input : 1
-----Pilih Cara Input-----
[1].Random
[2].Input User
Input : 1
3 3 6 A
24 Solutions found
1. ((1+6)*3)+3
2. ((3+6)-1)*3
3. ((3-1)+6)*3
4. ((6+1)*3)+3
5. ((6+3)-1)*3
6. ((6-1)+3)*3
7. (3*(1+6))+3
8. (3*(3+6-1))
9. (3*(3+6)-1)
10. (3*(3-(1-6)))
11. (3*(3-1)+6)
12. (3*(6+(3-1)))
13. (3*(6+1))+3
14. (3*(6+3)-1)
15. (3*(6-(1-3)))
16. (3*(6-1)+3)
17. (3+(1+6)*3)
18. (3+(3*(1+6)))
19. (3+(3*(6+1)))
20. (3+(6+1)*3)
21. (3+(6-1))*3
22. (3-(1-6))*3
23. (6+(3-1))*3
24. (6-(1-3))*3
Execution Time : 9 ms
Apakah ingin menyimpan solusi ? (Y/N) : Y
Input nama file : testcase4
PS C:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1Stima\src>
```

```
Tucil1Stima > test > testcase4.txt
```

```
1 3 3 6 A
2 24 Solutions
3 ((1+6)*3)+3
4 ((3+6)-1)*3
5 ((3-1)+6)*3
6 ((6+1)*3)+3
7 ((6+3)-1)*3
8 ((6-1)+3)*3
9 (3*(1+6))+3
10 (3*(3+6-1))
11 (3*(3+6)-1)
12 (3*(3-(1-6)))
13 (3*(3-1)+6)
14 (3*(6+(3-1)))
15 (3*(6+1))+3
16 (3*(6+3)-1)
17 (3*(6-(1-3)))
18 (3*(6-1)+3)
19 (3+(1+6)*3)
20 (3+(3*(1+6)))
21 (3+(3*(6+1)))
22 (3+(6+1)*3)
23 (3+(6-1))*3
24 (3-(1-6))*3
25 (6+(3-1))*3
26 (6-(1-3))*3
27
```

## 5. Testcase 5 Random (9 9 3 Q) (testcase5.txt)

```
PS C:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1STima\src> cd "c:\Users\ASUS\Tucil1 STIMA\24Solver-Tucil1-STIMA\Tucil1STima\src\" ; if ($?) { g++ main.cpp -o main } ; if ($?) { .\main }
```

```
=====
24 SOLVER
=====
[1].Start
[2].Exit
Input : 1
=====Pilih Cara Input=====
[1].Random
[2].Input User
Input : 1
9 9 3 Q
32 Solutions found
1. ((12-9)*9)-3)
2. ((3*9)+9)-12)
3. ((3*9)-12)+9)
4. ((9*3)+9)-12)
5. ((9*3)-12)+9)
6. ((9/3)+12)+9)
7. ((9/3)+9)+12)
8. (12*(3-(9/9)))
9. (12+(9+(9/3)))
10. (12+(9/3))+9)
11. (12+(9/3)+9))
12. (12+9)+(9/3)
13. (3*9)+(9-12)
14. (3*9)-(12-9)
15. (3-(9/9))*12)
16. (9*(12-9))-3)
17. (9*3)+(9-12)
18. (9*3)-(12-9)
19. (9+(12+(9/3)))
20. (9+(3*9))-12)
21. (9+(3*9)-12))
22. (9+(9*3))-12)
23. (9+(9*3)-12))
24. (9+(9/3))+12)
25. (9+(9/3)+12))
26. (9+12)+(9/3)
27. (9-(12-(3*9)))
28. (9-(12-(9*3)))
29. (9-12)+(3*9)
30. (9-12)+(9*3)
31. (9/3)+(12+9)
32. (9/3)+(9+12)
Execution time : 8 ms
Apakah ingin menyimpan solusi ? (Y/N) : Y
Input nama file : testcase5
```

```
Tucil1STima> test > testcase5.txt
```

```
1 9 9 3 Q
2 32 Solutions
3 ((12-9)*9)-3)
4 ((3*9)+9)-12)
5 ((3*9)-12)+9)
6 ((9*3)+9)-12)
7 ((9*3)-12)+9)
8 ((9/3)+12)+9)
9 ((9/3)+9)+12)
10 (12*(3-(9/9)))
11 (12+(9+(9/3)))
12 (12+(9/3))+9)
13 (12+(9/3)+9))
14 (12+9)+(9/3)
15 (3*9)+(9-12)
16 (3*9)-(12-9)
17 (3-(9/9))*12)
18 (9*(12-9))-3)
19 (9*3)+(9-12)
20 (9*3)-(12-9)
21 (9+(12+(9/3)))
22 (9+(3*9))-12)
23 (9+(3*9)-12))
24 (9+(9*3))-12)
25 (9+(9*3)-12))
26 (9+(9/3))+12)
27 (9+(9/3)+12))
28 (9+12)+(9/3)
29 (9-(12-(3*9)))
30 (9-(12-(9*3)))
31 (9-12)+(3*9)
32 (9-12)+(9*3)
33 (9/3)+(12+9)
34 (9/3)+(9+12)
```

## 6. Testcase 6 Random (J 9 A Q) (testcase6.txt)

```
PS C:\Users\ASUS\Tucil1 STIPA\24Solver-Tucil1-STIPA\Tucil1Stima\src> cd "c:\Users\ASUS\Tucil1 STIPA\24Solver-Tucil1-STIPA\Tucil1Stima\src\" ; if ($?) { g++ main.cpp -o main } ; if ($?) { .\main }

=====[START/EXIT]=====
[1].Start
[2].Exit
Input : 1
=====Pilih Cara Input=====
[1].Random
[2].Input User
Input : 1
J 9 A Q
32 Solutions found
1. ((1*11)-9)*12
2. ((11*1)-9)*12
3. ((11-9)*1)*12
4. ((11-9)*12)*1
5. ((11-9)*12)/1
6. ((11-9)/1)*12
7. ((11/1)-9)*12
8. (1*(11-9))*12
9. (1*(11-9)*12)
10. (1*(12*(11-9)))
11. (1*12)*(11-9)
12. (11-(1*9))*12
13. (11-(9*1))*12
14. (11-(9/1))*12
15. (11-9)*(1*12)
16. (11-9)*(12*1)
17. (11-9)*(12/1)
18. (11-9)/(1/12)
19. (12*(1*(11-9)))
20. (12*(1*11)-9)
21. (12*(11*1)-9)
22. (12*(11-(1*9)))
23. (12*(11-(9*1)))
24. (12*(11-(9/1)))
25. (12*(11-9))*1
26. (12*(11-9))/1
27. (12*(11-9)*1)
28. (12*(11-9)/1)
29. (12*(11/1)-9)
30. (12*1)*(11-9)
31. (12/(1/(11-9)))
32. (12/1)*(11-9)
Execution Time : 8 ms
Apakah ingin menyimpan solusi ? (Y/N) : Y
Input nama file : testcase6
```

Tucil1Stima > test > testcase6.txt

```
1 J 9 A Q
2 32 Solutions
3 ((1*11)-9)*12
4 ((11*1)-9)*12
5 ((11-9)*1)*12
6 ((11-9)*12)*1
7 ((11-9)*12)/1
8 ((11-9)/1)*12
9 ((11/1)-9)*12
10 (1*(11-9))*12
11 (1*(11-9)*12)
12 (1*(12*(11-9)))
13 (1*12)*(11-9)
14 (11-(1*9))*12
15 (11-(9*1))*12
16 (11-(9/1))*12
17 (11-9)*(1*12)
18 (11-9)*(12*1)
19 (11-9)*(12/1)
20 (11-9)/(1/12)
21 (12*(1*(11-9)))
22 (12*(1*11)-9)
23 (12*(11*1)-9)
24 (12*(11-(1*9)))
25 (12*(11-(9*1)))
26 (12*(11-(9/1)))
27 (12*(11-9))*1
28 (12*(11-9))/1
29 (12*(11-9)*1)
30 (12*(11-9)/1)
31 (12*(11/1)-9)
32 (12*1)*(11-9)
33 (12/(1/(11-9)))
34 (12/1)*(11-9)
```

#### ***D. Link To Repository***

[https://github.com/zaydanA/Tucil1\\_13521104.git](https://github.com/zaydanA/Tucil1_13521104.git)

#### **E. Table**

<b>Poin</b>	<b>Ya</b>	<b>Tidak</b>
1. Program berhasil dikompilasi tanpa kesalahan	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Program berhasil running	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Program dapat membaca input / generate sendiri dan memberikan luaran	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Solusi yang diberikan program memenuhi (berhasil mencapai 24)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Program dapat menyimpan solusi dalam file teks	<input checked="" type="checkbox"/>	<input type="checkbox"/>