**VBAコード**

**Dim a(200) As Integer**

**Private Sub CommandButton1\_Click()**

**CommandButton2\_Click**

**Dim s As Integer**

**s = Cells(1, 4)**

**Dim hnt As Byte**

**hnt = Cells(5, 13)**

**If hnt < 20 Or hnt > 28 Then**

**Cells(8, 12) = "入力できるヒント数は20以上で28以下です。"**

**Cells(9, 12) = "ヒント数29以上の場合はこのソフトではなく、"**

**Cells(10, 12) = "数独自動生成新方式アプリ（ハイブリッド方式）のVer.3からVer.5を使って下さい。"**

**Exit Sub**

**End If**

**hj = Timer**

**Dim i As Integer, j As Integer**

**Set ws = CreateObject("WScript.Shell")**

**ws.CurrentDirectory = "c:\sudokunew"**

**tobi:**

**If Cells(5, 13) = 20 Then ws.Run """20.exe""", 1, True**

**If Cells(5, 13) = 21 Then ws.Run """21.exe""", 1, True**

**If Cells(5, 13) = 22 Then ws.Run """22.exe""", 1, True**

**If Cells(5, 13) = 23 Then ws.Run """23.exe""", 1, True**

**If Cells(5, 13) = 24 Then ws.Run """24.exe""", 1, True**

**If Cells(5, 13) = 25 Then ws.Run """25.exe""", 1, True**

**If Cells(5, 13) = 26 Then ws.Run """26.exe""", 1, True**

**If Cells(5, 13) = 27 Then ws.Run """27.exe""", 1, True**

**If Cells(5, 13) = 28 Then ws.Run """28.exe""", 1, True**

**Dim buf As String**

**Open "C:\sudokunew\a.csv" For Input As #1**

**Dim w As Byte**

**w = 0**

**Do Until EOF(1)**

**Line Input #1, buf**

**a(w) = CByte(buf)**

**w = w + 1**

**Loop**

**Close #1**

**Dim x As Integer**

**Dim y As Integer**

**y = 20 \* (Int(s / 10)) + 1**

**x = 10 \* (s Mod 10) + 1**

**Sheet2.Cells(y, x) = s + 1**

**Sheet2.Cells(y + 3, x) = a(162)**

**Sheet2.Cells(y + 5, x) = hnt**

**For i = 0 To 80**

**If a(i) > 0 Then**

**Cells(3 + Int(i / 9), 2 + (i Mod 9)) = a(i)**

**End If**

**Next**

**For i = 81 To 161**

**If a(i) > 0 Then**

**Cells(33 + Int((i - 81) / 9), 2 + ((i - 81) Mod 9)) = a(i)**

**End If**

**Next**

**Dim e As Byte**

**e = a(162)**

**Dim y0 As Byte, x0 As Byte**

**If s > 0 Then**

**For i = 0 To s - 1**

**y0 = 20 \* (Int(i / 10)) + 1**

**x0 = 10 \* (i Mod 10) + 1**

**If Sheet2.Cells(y0 + 5, x) <> hnt Then GoTo tobi2**

**If Sheet2.Cells(y0 + 3, x) <> a(162) Then GoTo tobi2**

**For j = 0 To 80**

**If Cells(3 + Int(j / 9), 2 + (j Mod 9)) <> Sheet2.Cells(y0 + 1 + Int(j / 9), x0 + 1 + (j Mod 9)) Then GoTo tobi2**

**Next**

**Next**

**Dim b(81) As Integer**

**Dim 選択 As Byte**

**選択 = 3 \* Rnd**

**If 選択 = 0 Then**

**For j = 0 To 80**

**If a(j) = 0 Then b(j) = 0**

**If a(j) = 1 Then b(j) = 7**

**If a(j) = 2 Then b(j) = 4**

**If a(j) = 3 Then b(j) = 9**

**If a(j) = 4 Then b(j) = 1**

**If a(j) = 5 Then b(j) = 6**

**If a(j) = 6 Then b(j) = 8**

**If a(j) = 7 Then b(j) = 5**

**If a(j) = 8 Then b(j) = 2**

**If a(j) = 9 Then b(j) = 3**

**Next**

**End If**

**If 選択 = 1 Then**

**For j = 0 To 80**

**If a(j) = 0 Then b(j) = 0**

**If a(j) = 1 Then b(j) = 6**

**If a(j) = 2 Then b(j) = 5**

**If a(j) = 3 Then b(j) = 8**

**If a(j) = 4 Then b(j) = 2**

**If a(j) = 5 Then b(j) = 7**

**If a(j) = 6 Then b(j) = 3**

**If a(j) = 7 Then b(j) = 4**

**If a(j) = 8 Then b(j) = 1**

**If a(j) = 9 Then b(j) = 9**

**Next**

**End If**

**If 選択 = 2 Then**

**For j = 0 To 80**

**If a(j) = 0 Then b(j) = 0**

**If a(j) = 1 Then b(j) = 5**

**If a(j) = 2 Then b(j) = 6**

**If a(j) = 3 Then b(j) = 7**

**If a(j) = 4 Then b(j) = 8**

**If a(j) = 5 Then b(j) = 9**

**If a(j) = 6 Then b(j) = 1**

**If a(j) = 7 Then b(j) = 2**

**If a(j) = 8 Then b(j) = 3**

**If a(j) = 9 Then b(j) = 4**

**Next**

**End If**

**For j = 0 To 80**

**If b(j) > 0 Then**

**Cells(13 + (j Mod 9), 2 + Int(j / 9)) = b(j)**

**End If**

**Next**

**For j = 81 To 161**

**Cells(33 + ((j - 81) Mod 9), 2 + Int((j - 81) / 9)) = b(j)**

**Next**

**If a(162) = 0 Then e = 1**

**If a(162) = 1 Then e = 0**

**If a(162) = 2 Then e = 2**

**If a(162) = 3 Then e = 3**

**If Sheet2.Cells(y0 + 3, x) <> e Then GoTo tobi2**

**For j = 0 To 80**

**If Cells(3 + Int(j / 9), 2 + (j Mod 9)) <> (Sheet2.Cells(y0 + 1 + Int(j / 9), x0 + 1 + (j Mod 9))) Then GoTo tobi2**

**Next**

**GoTo tobi**

**End If**

**tobi2:**

**Sheet2.Cells(y, x) = s + 1**

**Sheet2.Cells(y + 3, x) = e**

**Sheet2.Cells(y + 5, x) = hnt**

**For i = 0 To 80**

**Cells(13 + Int(i / 9), 2 + (i Mod 9)) = Cells(3 + Int(i / 9), 2 + (i Mod 9))**

**Cells(23 + Int(i / 9), 2 + (i Mod 9)) = Cells(3 + (i Mod 9), 2 + Int(i / 9))**

**Sheet2.Cells(y + 1 + Int(i / 9), x + 1 + (i Mod 9)) = Cells(3 + Int(i / 9), 2 + (i Mod 9))**

**Next**

**For i = 0 To 80**

**Sheet2.Cells(y + 11 + Int(i / 9), x + 1 + (i Mod 9)) = Cells(33 + Int(i / 9), 2 + (i Mod 9))**

**Next**

**Cells(1, 4) = s + 1**

**ow = Timer**

**If e = 0 Then Cells(10, 12) = "左右に対称"**

**If e = 1 Then Cells(10, 12) = "上下に対称"**

**If e = 2 Then Cells(10, 12) = "点対称"**

**If e = 3 Then Cells(10, 12) = "線対称かつ点対称"**

**Cells(6, 12) = "問題作成時間は"**

**Cells(7, 12) = ow - hj**

**Cells(8, 12) = "秒です。"**

**End Sub**

**Private Sub CommandButton2\_Click()**

**Sheets("Sheet1").Select**

**Range("B3:J11").Select**

**Selection.ClearContents**

**'Cells(1, 4) = 0**

**Range("B13:J21").Select**

**Selection.ClearContents**

**Range("B23:J31").Select**

**Selection.ClearContents**

**Range("B33:J41").Select**

**Selection.ClearContents**

**Range("L6:L10").Select**

**Selection.ClearContents**

**Range("A1").Select**

**End Sub**

**Private Sub CommandButton3\_Click()**

**Macro1**

**'Cells(1, 4) = 0**

**CommandButton2\_Click**

**End Sub**

**Sub Macro1()**

**Sheets("Sheet2").Select**

**Cells.Select**

**Selection.ClearContents**

**Range("A1").Select**

**End Sub**

**C++36スレッドプログラミング**

**#pragma warning(disable: 4996)**

**#include<iostream>**

**#include<stdlib.h> /\*callocやrand,srandを使うのに必要\*/**

**#include<ctime>**

**#include<process.h>**

**#include<conio.h> //while (!\_kbhit()); を使うためのお呪い。**

**#include <math.h>**

**#include <cmath>**

**#include<process.h>**

**#include <iomanip>**

**#include <stdio.h>**

**#include <stdlib.h>**

**using namespace std;**

**const unsigned char th = 12;**

**void f(unsigned char g, unsigned char a);**

**void f1(unsigned char g, unsigned char a);**

**void sayu(unsigned char a);**

**void jyoge(unsigned char a);**

**void ten(unsigned char a);**

**void sayujyoge(unsigned char a);**

**void kokoro(unsigned char a);**

**void kyokusyokaiseki(unsigned char s, unsigned char t, unsigned char a);**

**void dainyu(unsigned char a);**

**char keizoku = 1;**

**unsigned char\* ht = (unsigned char\*)calloc(th, sizeof(unsigned char));**

**unsigned u = (unsigned)time(NULL);**

**void sudoku(void\* a);**

**void syokika(unsigned char a);**

**void nyuryokujyun(unsigned char g, unsigned char a);**

**unsigned char ks(unsigned char a);**

**unsigned char totalkaiseki(unsigned char a);**

**void kaitosakusei(unsigned char a);**

**void linehaijyo(unsigned char a);**

**void souhokakutei(unsigned char a);**

**void tont(unsigned char a);**

**void listhou(unsigned char a);**

**void gyou(unsigned char a);**

**void retu(unsigned char a);**

**void block(unsigned char a);**

**void sgyou(unsigned char a);**

**void sretu(unsigned char a);**

**void sblock(unsigned char a);**

**void tontgyou(unsigned char a);**

**void tontretu(unsigned char a);**

**void tontblock(unsigned char a);**

**void shphaijyo(unsigned char a);**

**unsigned char m[th][9][9], mx[th][9][9], wb[th][9][9][9], rlst[th][9][9][9], y[th][81], x[th][81];**

**unsigned char yy[th][81], xx[th][81], cm[th][9][9], ccm[th][9][9];**

**unsigned char hnt, owari = 0, krn[th], cn[th];**

**unsigned char S;**

**unsigned char main() {**

**unsigned char ii[th];**

**hnt = 20;**

**clock\_t hj, ow;**

**hj = clock();**

**tobi:;**

**u = (unsigned)time(NULL);**

**keizoku = 1;**

**for (unsigned char i = 1; i < th; i += 1) {**

**ii[i] = i;**

**\_beginthread(sudoku, 0, &ii[i]); //新しいスレッドを起動して、そのスレッド上で関数f1を働かせなさいの命令**

**}**

**srand(u);**

**while (1) {**

**syokika(0);**

**int sentaku = rand() % 4;**

**if (sentaku == 0) sayu(0);**

**if (sentaku == 1) jyoge(0);**

**if (sentaku == 2) ten(0);**

**if (sentaku == 3) sayujyoge(0);**

**if (sentaku == 4) kokoro(0);**

**if (keizoku == 0)break;**

**cn[0] = 0;**

**f1(0, 0);**

**if (keizoku == 0)break;**

**dainyu(0);**

**if (keizoku == 0)break;**

**cn[0] = 0;**

**krn[0] = 81 - hnt;**

**kaitosakusei(0);**

**//f(hnt, 0);**

**if (cn[0] == 1) {**

**S = sentaku;**

**ht[0] = 1;**

**keizoku = 0;**

**break;**

**}**

**}**

**while (keizoku);**

**unsigned char ik;**

**for (unsigned char i = 0; i < th; i++)if (ht[i] == 1) { ik = i; break; }**

**//数独を見つけたスレッドを特定した。**

**FILE\* fp;**

**/\*ファイル(save.csv)に書き込む\*/**

**if ((fp = fopen("a.csv", "w")) != NULL) {**

**for (unsigned char i = 0; i < 9; i++) {**

**for (unsigned char j = 0; j < 9; j++) {**

**fprintf(fp, "%d,\n", cm[ik][i][j]);**

**}**

**}**

**for (unsigned char i = 0; i < 9; i++) {**

**for (unsigned char j = 0; j < 9; j++) {**

**/\*カンマで区切ることでCSVファイルとする\*/**

**fprintf(fp, "%d,\n", m[ik][i][j]);**

**}**

**}**

**}**

**/\*忘れずに閉じる\*/**

**fclose(fp);**

**//for (int i = 0; i < 10; i++) {**

**// if (i % 3 == 0) {**

**// cout << " ";**

**// for (int j = 0; j < 12; j++) {**

**// cout << "- ";**

**// }**

**// cout << " ";**

**// cout << endl;**

**// }**

**// if (i == 9)break;**

**// for (int j = 0; j < 10; j++) {**

**// if (j % 3 == 0) {**

**// cout << "| ";**

**// }**

**// if (j < 9) {**

**// if (cm[ik][i][j] == 0)cout << "\* "; else cout << +cm[ik][i][j] << " ";//問題**

**// }**

**// }**

**// cout << endl;**

**//}**

**//cout << endl;**

**//for (int i = 0; i < 10; i++) {**

**// if (i % 3 == 0) {**

**// cout << " ";**

**// for (int j = 0; j < 12; j++) {**

**// cout << "- ";**

**// }**

**// cout << " ";**

**// cout << endl;**

**// }**

**// if (i == 9)break;**

**// for (int j = 0; j < 10; j++) {**

**// if (j % 3 == 0) {**

**// cout << "| ";**

**// }**

**// if (j < 9) {**

**// if (m[ik][i][j] == 0)cout << "\* "; else cout << +m[ik][i][j] << " ";//問題**

**// }**

**// }**

**// cout << endl;**

**//}**

**if (ks(ik) == 1)cout << "〇" << endl;**

**if (S == 0)cout << "左右対称型" << endl;**

**if (S == 1)cout << "上下対称型" << endl;**

**if (S == 2)cout << "点対称型" << endl;**

**if (S == 3)cout << "線対称型かつ点対称型" << endl;**

**ow = clock();**

**cout << "計算時間は" << (double)(ow - hj) / CLOCKS\_PER\_SEC << "秒です。" << endl;**

**//while (!\_kbhit()); //待機させるための命令**

**return 0;**

**}**

**void kaitosakusei(unsigned char a) {**

**unsigned char i, kkrn;**

**if (totalkaiseki(a) == 1) {**

**cn[a] = 2;**

**return;**

**}**

**for (i = 0; i < 9; i++) {**

**kkrn = krn[a];**

**linehaijyo(a);**

**if (cn[a] > 0) return;**

**if (krn[a] == 0) {**

**cn[a] = 1;**

**return;**

**}**

**souhokakutei(a);**

**tont(a);**

**shphaijyo(a);**

**if (krn[a] == 0) {**

**cn[a] = 1;**

**return;**

**}**

**listhou(a);**

**if (cn[a] > 0)return;**

**if (krn[a] == 0) {**

**cn[a] = 1;**

**return;**

**}**

**if (kkrn == krn[a]) {**

**cn[a] = 0;**

**return;**

**}**

**}**

**}**

**unsigned char totalkaiseki(unsigned char a) {**

**unsigned char i, j;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**if (m[a][i][j] == 0) {**

**kyokusyokaiseki(i, j, a);**

**if (mx[a][i][j] == 0) {**

**return(1);**

**}**

**}**

**}**

**}**

**return(0);**

**}**

**void gyou(unsigned char a) {**

**unsigned char i, j, k, w, jk, kk, s, t;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**w = 0;**

**for (k = 0; k < 9; k++) {**

**if (m[a][j][k] == 0) {**

**if (wb[a][j][k][i] == 0) {**

**jk = j;**

**kk = k;**

**w = w + 1;**

**}**

**}**

**}**

**if (w == 1) {**

**if (krn[a] == 0) {**

**cn[a] = 2;**

**return;**

**}**

**m[a][jk][kk] = i + 1;**

**krn[a] = krn[a] - 1;**

**if (krn[a] == 0) return;**

**for (k = 0; k < 9; k++) {**

**if (m[a][jk][k] == 0) {**

**wb[a][jk][k][m[a][jk][kk] - 1] = 1;**

**}**

**if (m[a][k][kk] == 0) {**

**wb[a][k][kk][m[a][jk][kk] - 1] = 1;**

**}**

**s = 3 \* (jk / 3) + (k / 3);**

**t = 3 \* (kk / 3) + (k % 3);**

**if (m[a][s][t] == 0) {**

**wb[a][s][t][m[a][jk][kk] - 1] = 1;**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (m[a][jk][k] == 0)kyokusyokaiseki(jk, k, a);**

**if (m[a][k][kk] == 0) kyokusyokaiseki(k, kk, a);**

**s = 3 \* (jk / 3) + (k / 3);**

**t = 3 \* (kk / 3) + (k % 3);**

**if (m[a][s][t] == 0)kyokusyokaiseki(s, t, a);**

**}**

**}**

**}**

**}**

**}**

**void retu(unsigned char a) {**

**unsigned char i, j, k, w, jk, kk, s, t;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**w = 0;**

**for (k = 0; k < 9; k++) {**

**if (m[a][k][j] == 0) {**

**if (wb[a][k][j][i] == 0) {**

**jk = j;**

**kk = k;**

**w = w + 1;**

**}**

**}**

**}**

**if (w == 1) {**

**if (krn[a] == 0) {**

**cn[a] = 2;**

**return;**

**}**

**m[a][kk][jk] = i + 1;**

**krn[a] = krn[a] - 1;**

**if (krn[a] == 0) return;**

**for (k = 0; k < 9; k++) {**

**if (m[a][kk][k] == 0) {**

**wb[a][kk][k][m[a][kk][jk] - 1] = 1;**

**}**

**if (m[a][k][jk] == 0) {**

**wb[a][k][jk][m[a][kk][jk] - 1] = 1;**

**}**

**s = 3 \* (kk / 3) + (k / 3);**

**t = 3 \* (jk / 3) + (k % 3);**

**if (m[a][s][t] == 0) {**

**wb[a][s][t][m[a][kk][jk] - 1] = 1;**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (m[a][kk][k] == 0)kyokusyokaiseki(kk, k, a);**

**if (m[a][k][jk] == 0)kyokusyokaiseki(k, jk, a);**

**s = 3 \* (kk / 3) + (k / 3);**

**t = 3 \* (jk / 3) + (k % 3);**

**if (m[a][s][t] == 0)kyokusyokaiseki(s, t, a);**

**}**

**}**

**}**

**}**

**}**

**void block(unsigned char a) {**

**unsigned char i, j, k, w, sk, tk, s, t, s1, t1;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**w = 0;**

**for (k = 0; k < 9; k++) {**

**s = 3 \* (j / 3) + (k / 3);**

**t = 3 \* (j % 3) + (k % 3);**

**if (m[a][s][t] == 0) {**

**if (wb[a][s][t][i] == 0) {**

**sk = s;**

**tk = t;**

**w = w + 1;**

**}**

**}**

**}**

**if (w == 1) {**

**if (krn[a] == 0) {**

**cn[a] = 2;**

**return;**

**}**

**m[a][sk][tk] = i + 1;**

**krn[a] = krn[a] - 1;**

**if (krn[a] == 0) return;**

**for (k = 0; k < 9; k++) {**

**if (m[a][sk][k] == 0) {**

**wb[a][sk][k][m[a][sk][tk] - 1] = 1;**

**}**

**if (m[a][k][tk] == 0) {**

**wb[a][k][tk][m[a][sk][tk] - 1] = 1;**

**}**

**s1 = 3 \* (sk / 3) + (k / 3);**

**t1 = 3 \* (tk / 3) + (k % 3);**

**if (m[a][s1][t1] == 0) {**

**wb[a][s1][t1][m[a][sk][tk] - 1] = 1;**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (m[a][sk][k] == 0)kyokusyokaiseki(sk, k, a);**

**if (m[a][k][tk] == 0)kyokusyokaiseki(k, tk, a);**

**s1 = 3 \* (sk / 3) + (k / 3);**

**t1 = 3 \* (tk / 3) + (k % 3);**

**if (m[a][s1][t1] == 0)kyokusyokaiseki(s1, t1, a);**

**}**

**}**

**}**

**}**

**}**

**void linehaijyo(unsigned char a) {**

**gyou(a);**

**if (krn[a] == 0) {**

**cn[a] = 1;**

**return;**

**}**

**retu(a);**

**if (krn[a] == 0) {**

**cn[a] = 1;**

**return;**

**}**

**block(a);**

**}**

**void sgyou(unsigned char a) {**

**unsigned char i, j, k, w, onoff[9];**

**unsigned char ckotae[9], l;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**for (k = j + 1; k < 9; k++) {**

**if (mx[a][i][j] == 2 && mx[a][i][k] == 2) {**

**for (l = 0; l < 9; l++) {**

**onoff[l] = 0;**

**}**

**for (l = 0; l < 2; l++) {**

**onoff[rlst[a][i][j][l] - 1] = 1;**

**onoff[rlst[a][i][k][l] - 1] = 1;**

**}**

**w = 0;**

**for (l = 0; l < 9; l++) {**

**if (onoff[l] == 1) {**

**ckotae[w] = l;**

**w = w + 1;**

**}**

**}**

**if (w == 2) {**

**for (l = 0; l < 9; l++) {**

**if (l != j && l != k) {**

**if (m[a][i][l] == 0) {**

**wb[a][i][l][ckotae[0]] = 1;**

**wb[a][i][l][ckotae[1]] = 1;**

**}**

**}**

**}**

**for (l = 0; l < 9; l++) {**

**if (l != j && l != k) {**

**if (m[a][i][l] == 0) {**

**kyokusyokaiseki(i, l, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void sretu(unsigned char a) {**

**unsigned char i, j, k, w, onoff[9];**

**unsigned char ckotae[9], l;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**for (k = j + 1; k < 9; k++) {**

**if (mx[a][j][i] == 2 && mx[a][k][i] == 2) {**

**for (l = 0; l < 9; l++) {**

**onoff[l] = 0;**

**}**

**for (l = 0; l < 2; l++) {**

**onoff[rlst[a][j][i][l] - 1] = 1;**

**onoff[rlst[a][k][i][l] - 1] = 1;**

**}**

**w = 0;**

**for (l = 0; l < 9; l++) {**

**if (onoff[l] == 1) {**

**ckotae[w] = l;**

**w = w + 1;**

**}**

**}**

**if (w == 2) {**

**for (l = 0; l < 9; l++) {**

**if (l != j && l != k) {**

**if (m[a][l][i] == 0) {**

**wb[a][l][i][ckotae[0]] = 1;**

**wb[a][l][i][ckotae[1]] = 1;**

**}**

**}**

**}**

**for (l = 0; l < 9; l++) {**

**if (l != j && l != k) {**

**if (m[a][l][i] == 0) {**

**kyokusyokaiseki(l, i, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void sblock(unsigned char a) {**

**unsigned char i, j, k, w, onoff[9], s1, s2, t1, t2, s3, t3;**

**unsigned char ckotae[9], l;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**s1 = 3 \* (i / 3) + (j / 3);**

**t1 = 3 \* (i % 3) + (j % 3);**

**for (k = j + 1; k < 9; k++) {**

**s2 = 3 \* (i / 3) + (k / 3);**

**t2 = 3 \* (i % 3) + (k % 3);**

**if (mx[a][s1][t1] == 2 && mx[a][s2][t2] == 2) {**

**for (l = 0; l < 9; l++) {**

**onoff[l] = 0;**

**}**

**for (l = 0; l < 2; l++) {**

**onoff[rlst[a][s1][t1][l] - 1] = 1;**

**onoff[rlst[a][s2][t2][l] - 1] = 1;**

**}**

**w = 0;**

**for (l = 0; l < 9; l++) {**

**if (onoff[l] == 1) {**

**ckotae[w] = l;**

**w = w + 1;**

**}**

**}**

**if (w == 2) {**

**for (l = 0; l < 9; l++) {**

**if (l != j && l != k) {**

**s3 = 3 \* (i / 3) + (l / 3);**

**t3 = 3 \* (i % 3) + (l % 3);**

**if (m[a][s3][t3] == 0) {**

**wb[a][s3][t3][ckotae[0]] = 1;**

**wb[a][s3][t3][ckotae[1]] = 1;**

**}**

**}**

**}**

**for (l = 0; l < 9; l++) {**

**if (l != j && l != k) {**

**s3 = 3 \* (i / 3) + (l / 3);**

**t3 = 3 \* (i % 3) + (l % 3);**

**if (m[a][s3][t3] == 0) {**

**kyokusyokaiseki(s3, t3, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void souhokakutei(unsigned char a) {**

**sgyou(a);**

**sretu(a);**

**sblock(a);**

**}**

**void tontgyou(unsigned char a) {**

**unsigned char i, j, k, w, onoff[9];**

**unsigned char ckotae[9], l, n;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**for (k = j + 1; k < 9; k++) {**

**for (l = k + 1; l < 9; l++) {**

**if ((m[a][i][j] == 2 || m[a][i][j] == 3) && (m[a][i][k] == 2 || m[a][i][k] == 3) && (m[a][i][l] == 2 || m[a][i][l] == 3)) {**

**for (n = 0; n < 9; n++) {**

**onoff[n] = 0;**

**}**

**for (n = 0; n < m[a][i][j]; n++) {**

**onoff[rlst[a][i][j][n] - 1] = 1;**

**}**

**for (n = 0; n < m[a][i][k]; n++) {**

**onoff[rlst[a][i][k][n] - 1] = 1;**

**}**

**for (n = 0; n < m[a][i][l]; n++) {**

**onoff[rlst[a][i][l][n] - 1] = 1;**

**}**

**w = 0;**

**for (n = 0; n < 9; n++) {**

**if (onoff[n] == 1) {**

**ckotae[w] = n;**

**w = w + 1;**

**}**

**}**

**if (w == 3) {**

**for (n = 0; n < 9; n++) {**

**if (n != j && n != k && n != l) {**

**if (m[a][i][n] == 0) {**

**wb[a][i][n][ckotae[0]] = 1;**

**wb[a][i][n][ckotae[1]] = 1;**

**wb[a][i][n][ckotae[2]] = 1;**

**}**

**}**

**}**

**for (n = 0; n < 9; n++) {**

**if (n != j && n != k && n != l) {**

**if (m[a][i][n] == 0) {**

**kyokusyokaiseki(i, n, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void tontretu(unsigned char a) {**

**unsigned char i, j, k, w, onoff[9];**

**unsigned char ckotae[9], l, n;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**for (k = j + 1; k < 9; k++) {**

**for (l = k + 1; l < 9; l++) {**

**if ((m[a][j][i] == 2 || m[a][j][i] == 3) && (m[a][k][i] == 2 || m[a][k][i] == 3) && (m[a][l][i] == 2 || m[a][l][i] == 3)) {**

**for (n = 0; n < 9; n++) {**

**onoff[n] = 0;**

**}**

**for (n = 0; n < m[a][j][i]; n++) {**

**onoff[rlst[a][j][i][n] - 1] = 1;**

**}**

**for (n = 0; n < m[a][k][i]; n++) {**

**onoff[rlst[a][k][i][n] - 1] = 1;**

**}**

**for (n = 0; n < m[a][l][i]; n++) {**

**onoff[rlst[a][l][i][n] - 1] = 1;**

**}**

**w = 0;**

**for (n = 0; n < 9; n++) {**

**if (onoff[n] == 1) {**

**ckotae[w] = n;**

**w = w + 1;**

**}**

**}**

**if (w == 3) {**

**for (n = 0; n < 9; n++) {**

**if (n != j && n != k && n != l) {**

**if (m[a][n][i] == 0) {**

**wb[a][n][i][ckotae[0]] = 1;**

**wb[a][n][i][ckotae[1]] = 1;**

**wb[a][n][i][ckotae[2]] = 1;**

**}**

**}**

**}**

**for (n = 0; n < 9; n++) {**

**if (n != j && n != k && n != l) {**

**if (m[a][n][i] == 0) {**

**kyokusyokaiseki(n, i, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void tontblock(unsigned char a) {**

**unsigned char i, j, k, w, onoff[9];**

**unsigned char ckotae[9], l, n;**

**unsigned char s1, s2, s3, s4, t1, t2, t3, t4;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**s1 = 3 \* (i / 3) + (j / 3);**

**t1 = 3 \* (i % 3) + (j % 3);**

**for (k = j + 1; k < 9; k++) {**

**s2 = 3 \* (i / 3) + (k / 3);**

**t2 = 3 \* (i % 3) + (k % 3);**

**for (l = k + 1; l < 9; l++) {**

**s3 = 3 \* (i / 3) + (l / 3);**

**t3 = 3 \* (i % 3) + (l % 3);**

**if ((m[a][s1][t1] == 2 || m[a][s1][t1] == 3) && (m[a][s2][t2] == 2 || m[a][s2][t2] == 3) && (m[a][s3][t3] == 2 || m[a][s3][t3] == 3)) {**

**for (n = 0; n < 9; n++) {**

**onoff[n] = 0;**

**}**

**for (n = 0; n < m[a][s1][t1]; n++) {**

**onoff[rlst[a][s1][t1][n] - 1] = 1;**

**}**

**for (n = 0; n < m[a][s2][t2]; n++) {**

**onoff[rlst[a][s2][t2][n] - 1] = 1;**

**}**

**for (n = 0; n < m[a][s3][t3]; n++) {**

**onoff[rlst[a][s3][t3][n] - 1] = 1;**

**}**

**w = 0;**

**for (n = 0; n < 9; n++) {**

**if (onoff[n] == 1) {**

**ckotae[w] = n;**

**w = w + 1;**

**}**

**}**

**if (w == 3) {**

**for (n = 0; n < 9; n++) {**

**if (n != j && n != k && n != l) {**

**s4 = 3 \* (i / 3) + (n / 3);**

**t4 = 3 \* (i % 3) + (n % 3);**

**if (m[a][s4][t4] == 0) {**

**wb[a][s4][t4][ckotae[0]] = 1;**

**wb[a][s4][t4][ckotae[1]] = 1;**

**wb[a][s4][t4][ckotae[2]] = 1;**

**}**

**}**

**}**

**for (n = 0; n < 9; n++) {**

**if (n != j && n != k && n != l) {**

**s4 = 3 \* (i / 3) + (n / 3);**

**t4 = 3 \* (i % 3) + (n % 3);**

**if (m[a][s4][t4] == 0) {**

**kyokusyokaiseki(s4, t4, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void tont(unsigned char a) {**

**tontgyou(a);**

**tontretu(a);**

**tontblock(a);**

**}**

**void shphaijyo(unsigned char a) {**

**unsigned char i, j, wx, wy, k;**

**unsigned char yk[9][9], xk[9][9];**

**for (i = 0; i < 9; i++) {**

**wy = 0;**

**for (j = 0; j < 9; j++) {**

**wx = 0;**

**for (k = 0; k < 9; k++) {**

**if (m[a][j][k] == 0) {**

**if (wb[a][j][k][i] == 0) {**

**yk[wy][wx] = j;**

**xk[wy][wx] = k;**

**wx = wx + 1;**

**}**

**}**

**}**

**if (wx == 2) {**

**wy = wy + 1;**

**}**

**}**

**if (wy == 2) {**

**if (xk[0][0] == xk[1][0] && xk[0][1] == xk[1][1]) {**

**for (k = 0; k < 9; k++) {**

**if (k != xk[0][0] && k != xk[0][1]) {**

**if (m[a][yk[0][0]][k] == 0) {**

**wb[a][yk[0][0]][k][i] = 1;**

**}**

**if (m[a][yk[1][1]][k] == 0) {**

**wb[a][yk[1][1]][k][i] = 1;**

**}**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (k != xk[0][0] && k != xk[0][1]) {**

**if (m[a][yk[0][0]][k] == 0) {**

**kyokusyokaiseki(yk[0][0], k, a);**

**}**

**if (m[a][yk[1][1]][k] == 0) {**

**kyokusyokaiseki(yk[1][1], k, a);**

**}**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (k != yk[0][0] && k != yk[1][1]) {**

**if (m[a][k][xk[0][0]] == 0) {**

**wb[a][k][xk[0][0]][i] = 1;**

**}**

**if (m[a][k][xk[1][1]] == 0) {**

**wb[a][k][xk[1][1]][i] = 1;**

**}**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (k != yk[0][0] && k != yk[1][1]) {**

**if (m[a][k][xk[0][0]] == 0) {**

**kyokusyokaiseki(k, xk[0][0], a);**

**}**

**if (m[a][k][xk[1][1]] == 0) {**

**kyokusyokaiseki(k, xk[1][1], a);**

**}**

**}**

**}**

**}**

**}**

**}**

**for (i = 0; i < 9; i++) {**

**wx = 0;**

**for (j = 0; j < 9; j++) {**

**wy = 0;**

**for (k = 0; k < 9; k++) {**

**if (m[a][k][j] == 0) {**

**if (wb[a][k][j][i] == 0) {**

**yk[wx][wy] = k;**

**xk[wx][wy] = j;**

**wy = wy + 1;**

**}**

**}**

**}**

**if (wy == 2) {**

**wx = wx + 1;**

**}**

**}**

**if (wx == 2) {**

**if (yk[0][0] == yk[1][0] && yk[0][1] == yk[1][1]) {**

**for (k = 0; k < 9; k++) {**

**if (k != yk[0][0] && k != yk[0][1]) {**

**if (m[a][k][xk[0][0]] == 0) {**

**wb[a][k][xk[0][0]][i] = 1;**

**}**

**if (m[a][k][xk[1][1]] == 0) {**

**wb[a][k][xk[1][1]][i] = 1;**

**}**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (k != yk[0][0] && k != yk[1][1]) {**

**if (m[a][k][xk[0][0]] == 0) {**

**kyokusyokaiseki(k, xk[0][0], a);**

**}**

**if (m[a][k][xk[1][1]] == 0) {**

**kyokusyokaiseki(k, xk[1][1], a);**

**}**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (k != xk[0][0] && k != xk[1][1]) {**

**if (m[a][yk[0][0]][k] == 0) {**

**wb[a][yk[0][0]][k][i] = 1;**

**}**

**if (m[a][yk[1][1]][k] == 0) {**

**wb[a][yk[1][1]][k][i] = 1;**

**}**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (k != xk[0][0] && k != xk[1][1]) {**

**if (m[a][yk[0][0]][k] == 0) {**

**kyokusyokaiseki(yk[0][0], k, a);**

**}**

**if (m[a][yk[1][1]][k] == 0) {**

**kyokusyokaiseki(yk[1][1], k, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**}**

**void listhou(unsigned char a) {**

**unsigned char i, j, k, s, t;**

**for (i = 0; i < 9; i++) {**

**for (j = 0; j < 9; j++) {**

**if (m[a][i][j] == 0) {**

**if (mx[a][i][j] == 0) {**

**cn[a] = 2;**

**return;**

**}**

**if (mx[a][i][j] == 1) {**

**m[a][i][j] = rlst[a][i][j][0];**

**krn[a] = krn[a] - 1;**

**if (krn[a] == 0)return;**

**for (k = 0; k < 9; k++) {**

**if (m[a][i][k] == 0) {**

**wb[a][i][k][m[a][i][j] - 1] = 1;**

**}**

**if (m[a][k][j] == 0) {**

**wb[a][k][j][m[a][i][j] - 1] = 1;**

**}**

**s = 3 \* (i / 3) + (k / 3);**

**t = 3 \* (j / 3) + (k % 3);**

**if (m[a][s][t] == 0) {**

**wb[a][s][t][m[a][i][j] - 1] = 1;**

**}**

**}**

**for (k = 0; k < 9; k++) {**

**if (m[a][i][k] == 0) kyokusyokaiseki(i, k, a);**

**if (m[a][k][j] == 0) kyokusyokaiseki(k, j, a);**

**s = 3 \* (i / 3) + (k / 3);**

**t = 3 \* (j / 3) + (k % 3);**

**if (m[a][s][t] == 0) kyokusyokaiseki(s, t, a);**

**}**

**}**

**}**

**}**

**}**

**}**

**void sayu(unsigned char a) {**

**unsigned char ty, gz;**

**if (hnt % 2 == 0) {**

**gz = rand() % 5;**

**if (gz == 0)ty = 0;**

**if (gz > 0 && gz < 4)ty = 2;**

**if (gz == 4)ty = 4;**

**}**

**else {**

**gz = rand() % 7;**

**if (gz < 4)ty = 1;**

**if (gz > 3 && gz < 6)ty = 3;**

**if (gz == 6)ty = 5;**

**}**

**//ty = 2;**

**unsigned char s = rand() % 11;**

**unsigned char rnk;**

**if (s == 0) rnk = 47;**

**if (s == 1) rnk = 7;**

**if (s == 2) rnk = 11;**

**if (s == 3) rnk = 13;**

**if (s == 4) rnk = 17;**

**if (s == 5) rnk = 19;**

**if (s == 6) rnk = 23;**

**if (s == 7) rnk = 29;**

**if (s == 8) rnk = 31;**

**if (s == 9) rnk = 37;**

**if (s == 10) rnk = 41;**

**//rnk = 4;**

**unsigned char ss = rand() % 9;**

**unsigned char sss = rand() % 36;**

**for (unsigned char i = 0; i < (hnt - ty) / 2; i++) {**

**xx[a][i] = ((i \* rnk + sss) % 36) / 9;**

**xx[a][hnt - 1 - i] = 8 - xx[a][i];**

**yy[a][i] = ((i \* rnk + sss) % 36) % 9;**

**yy[a][hnt - 1 - i] = yy[a][i];**

**}**

**unsigned char tyrnk;**

**while (1) {**

**tyrnk = rand() % 6;**

**if (tyrnk > 2 && tyrnk % 3 != 0)break;**

**}**

**for (unsigned char i = 0; i < ty; i++) {**

**xx[a][i + (hnt - ty) / 2] = 4;**

**yy[a][i + (hnt - ty) / 2] = (i \* tyrnk + ss) % 9;**

**}**

**}**

**void jyoge(unsigned char a) {**

**unsigned char ty, gz;**

**if (hnt % 2 == 0) {**

**gz = rand() % 5;**

**if (gz == 0)ty = 0;**

**if (gz > 0 && gz < 4)ty = 2;**

**if (gz == 4)ty = 4;**

**}**

**else {**

**gz = rand() % 7;**

**if (gz < 4)ty = 1;**

**if (gz > 3 && gz < 6)ty = 3;**

**if (gz == 6)ty = 5;**

**}**

**//ty = 2;**

**unsigned char s = rand() % 11;**

**unsigned char rnk;**

**if (s == 0) rnk = 47;**

**if (s == 1) rnk = 7;**

**if (s == 2) rnk = 11;**

**if (s == 3) rnk = 13;**

**if (s == 4) rnk = 17;**

**if (s == 5) rnk = 19;**

**if (s == 6) rnk = 23;**

**if (s == 7) rnk = 29;**

**if (s == 8) rnk = 31;**

**if (s == 9) rnk = 37;**

**if (s == 10) rnk = 41;**

**//rnk = 4;**

**unsigned char ss = rand() % 9;**

**unsigned char sss = rand() % 36;**

**for (unsigned char i = 0; i < (hnt - ty) / 2; i++) {**

**yy[a][i] = ((i \* rnk + sss) % 36) / 9;**

**yy[a][hnt - 1 - i] = 8 - yy[a][i];**

**xx[a][i] = ((i \* rnk + sss) % 36) % 9;**

**xx[a][hnt - 1 - i] = xx[a][i];**

**}**

**unsigned char tyrnk;**

**while (1) {**

**tyrnk = rand() % 6;**

**if (tyrnk > 2 && tyrnk % 3 != 0)break;**

**}**

**for (unsigned char i = 0; i < ty; i++) {**

**yy[a][i + (hnt - ty) / 2] = 4;**

**xx[a][i + (hnt - ty) / 2] = (i \* tyrnk + ss) % 9;**

**}**

**}**

**void ten(unsigned char a) {**

**unsigned char s, rnk, sss;**

**s = rand() % 11;**

**if (s == 0) rnk = 47;**

**if (s == 1) rnk = 7;**

**if (s == 2) rnk = 11;**

**if (s == 3) rnk = 13;**

**if (s == 4) rnk = 17;**

**if (s == 5) rnk = 19;**

**if (s == 6) rnk = 23;**

**if (s == 7) rnk = 29;**

**if (s == 8) rnk = 31;**

**if (s == 9) rnk = 59;**

**if (s == 10) rnk = 61;**

**while (1) {**

**s = rand() % (hnt / 9 + 2);**

**if ((hnt - s) % 2 == 0) break;**

**}**

**sss = rand() \* 40;**

**if (hnt % 2 == 0) {**

**for (unsigned char i = 0; i < hnt / 2; i++) {**

**yy[a][i] = ((i \* rnk + sss) % 40) / 9;**

**yy[a][hnt - 1 - i] = 8 - yy[a][i];**

**xx[a][i] = ((i \* rnk + sss) % 40) % 9;**

**xx[a][hnt - 1 - i] = 8 - xx[a][i];**

**}**

**}**

**else {**

**for (unsigned char i = 0; i < hnt / 2; i++) {**

**yy[a][i] = ((i \* rnk + sss) % 40) / 9;**

**yy[a][hnt - 1 - i] = 8 - yy[a][i];**

**xx[a][i] = ((i \* rnk + sss) % 40) % 9;**

**xx[a][hnt - 1 - i] = 8 - xx[a][i];**

**}**

**yy[a][(hnt - 1) / 2] = 4;**

**xx[a][(hnt - 1) / 2] = 4;**

**}**

**}**

**void sayujyoge(unsigned char a) {**

**unsigned char sss, b, rnk, s, mns;**

**unsigned char kh[16];**

**if (hnt % 2 == 0) {**

**if (hnt % 4 == 0) {**

**s = rand() % 5;**

**if (s == 0) rnk = 3;**

**if (s == 1) rnk = 5;**

**if (s == 2) rnk = 7;**

**if (s == 3) rnk = 11;**

**if (s == 4) rnk = 13;**

**sss = rand() % 16;**

**b = hnt / 4 - 1;**

**for (unsigned char i = 0; i < b + 1; i++) {**

**kh[i] = (sss + rnk \* i) % 16;**

**}**

**for (unsigned char i = 0; i < b + 1; i++) {**

**yy[a][i] = kh[i] / 4;**

**xx[a][i] = kh[i] % 4;**

**yy[a][2 \* (b + 1) - i - 1] = yy[a][i];**

**xx[a][2 \* (b + 1) - i - 1] = 8 - xx[a][i];**

**yy[a][3 \* (b + 1) - i - 1] = 8 - yy[a][i];**

**xx[a][3 \* (b + 1) - i - 1] = xx[a][i];**

**yy[a][4 \* (b + 1) - i - 1] = 8 - yy[a][i];**

**xx[a][4 \* (b + 1) - i - 1] = 8 - xx[a][i];**

**}**

**return;**

**}**

**s = rand() % 3;**

**if (s < 2) mns = 1; else mns = 3;**

**s = rand() % 4;**

**for (unsigned char i = 0; i < mns + 1; i++) {**

**xx[a][i] = 4;**

**xx[a][2 \* mns - 1 - i] = 4;**

**yy[a][i] = (s + 3 \* i) % 4;**

**yy[a][2 \* mns - 1 - i] = 8 - yy[a][i];**

**}**

**b = (hnt - 2 \* mns) / 4 - 1;**

**s = rand() % 5;**

**if (s == 0) rnk = 3;**

**if (s == 1) rnk = 5;**

**if (s == 2) rnk = 7;**

**if (s == 3) rnk = 11;**

**if (s == 4) rnk = 13;**

**sss = rand() % 16;**

**for (unsigned char i = 0; i < b + 1; i++) {**

**kh[i] = (sss + rnk \* i) % 16;**

**}**

**for (unsigned char i = 0; i < b + 1; i++) {**

**yy[a][2 \* mns + i] = kh[i] / 4;**

**xx[a][2 \* mns + i] = kh[i] % 4;**

**yy[a][2 \* mns + 2 \* (b + 1) - i - 1] = yy[a][2 \* mns + i];**

**xx[a][2 \* mns + 2 \* (b + 1) - i - 1] = 8 - xx[a][2 \* mns + i];**

**yy[a][2 \* mns + 3 \* (b + 1) - i - 1] = 8 - yy[a][2 \* mns + i];**

**xx[a][2 \* mns + 3 \* (b + 1) - i - 1] = xx[a][2 \* mns + i];**

**yy[a][2 \* mns + 4 \* (b + 1) - i - 1] = 8 - yy[a][2 \* mns + i];**

**xx[a][2 \* mns + 4 \* (b + 1) - i - 1] = 8 - xx[a][2 \* mns + i];**

**}**

**return;**

**}**

**if (hnt % 2 == 1) {**

**xx[a][0] = 4;**

**yy[a][0] = 4;**

**if (((hnt - 1) % 4) == 0) {**

**s = rand() % 5;**

**if (s == 0) rnk = 3;**

**if (s == 1) rnk = 5;**

**if (s == 2) rnk = 7;**

**if (s == 3) rnk = 11;**

**if (s == 4) rnk = 13;**

**sss = rand() % 16;**

**b = (hnt - 1) / 4 - 1;**

**for (unsigned char i = 0; i < b + 1; i++) {**

**kh[i] = (sss + rnk \* i) % 16;**

**}**

**for (unsigned char i = 0; i < b + 1; i++) {**

**yy[a][1 + i] = kh[i] / 4;**

**xx[a][1 + i] = kh[i] % 4;**

**yy[a][1 + 2 \* (b + 1) - i - 1] = yy[a][1 + i];**

**xx[a][1 + 2 \* (b + 1) - i - 1] = 8 - xx[a][1 + i];**

**yy[a][1 + 3 \* (b + 1) - i - 1] = 8 - yy[a][1 + i];**

**xx[a][1 + 3 \* (b + 1) - i - 1] = xx[a][1 + i];**

**yy[a][1 + 4 \* (b + 1) - i - 1] = 8 - yy[a][1 + i];**

**xx[a][1 + 4 \* (b + 1) - i - 1] = 8 - xx[a][1 + i];**

**}**

**return;**

**}**

**s = rand() % 3;**

**if (s < 2) mns = 1; else mns = 3;**

**s = rand() % 4;**

**mns = 3;**

**for (unsigned char i = 0; i < mns; i++) {**

**xx[a][1 + i] = 4;**

**xx[a][1 + 2 \* mns - 1 - i] = 4;**

**yy[a][1 + i] = (s + 3 \* i) % 4;**

**yy[a][1 + 2 \* mns - 1 - i] = 8 - yy[a][1 + i];**

**}**

**b = (hnt - 1 - 2 \* mns) / 4 - 1;**

**s = rand() % 4;**

**if (s == 0) rnk = 3;**

**if (s == 1) rnk = 5;**

**if (s == 2) rnk = 7;**

**if (s == 3) rnk = 11;**

**sss = rand() % 16;**

**for (unsigned char i = 0; i < b + 1; i++) {**

**kh[i] = (sss + rnk \* i) % 16;**

**}**

**for (unsigned char i = 0; i < b + 1; i++) {**

**yy[a][1 + 2 \* mns + i] = kh[i] / 4;**

**xx[a][1 + 2 \* mns + i] = kh[i] % 4;**

**yy[a][1 + 2 \* mns + 2 \* (b + 1) - i - 1] = yy[a][1 + 2 \* mns + i];**

**xx[a][1 + 2 \* mns + 2 \* (b + 1) - i - 1] = 8 - xx[a][1 + 2 \* mns + i];**

**yy[a][1 + 2 \* mns + 3 \* (b + 1) - i - 1] = 8 - yy[a][1 + 2 \* mns + i];**

**xx[a][1 + 2 \* mns + 3 \* (b + 1) - i - 1] = xx[a][1 + 2 \* mns + i];**

**yy[a][1 + 2 \* mns + 4 \* (b + 1) - i - 1] = 8 - yy[a][1 + 2 \* mns + i];**

**xx[a][1 + 2 \* mns + 4 \* (b + 1) - i - 1] = 8 - xx[a][1 + 2 \* mns + i];**

**}**

**}**

**}**

**void kokoro(unsigned char a) {**

**unsigned char b[8][8];**

**for (unsigned char i = 0; i < 5; i++) {**

**yy[a][i] = 8 - i;**

**xx[a][i] = 4 - i;**

**}**

**for (unsigned char i = 5; i < 9; i++) {**

**yy[a][i] = yy[a][i - 4];**

**xx[a][i] = 8 - xx[a][i - 4];**

**}**

**yy[a][9] = 3;**

**xx[a][9] = 0;**

**yy[a][25] = 3;**

**xx[a][25] = 8;**

**for (unsigned char i = 11; i < 13; i++) {**

**yy[a][i] = 13 - i;**

**xx[a][i] = i - 11;**

**yy[a][i + 2] = yy[a][i];**

**xx[a][i + 2] = 8 - xx[a][i];**

**}**

**for (unsigned char i = 15; i < 125; i++) {**

**yy[a][i] = i - 14;**

**xx[a][i] = i - 13;**

**yy[a][i + 2] = yy[a][i];**

**xx[a][i + 2] = 8 - xx[a][i];**

**}**

**yy[a][19] = 3;**

**xx[a][19] = 4;**

**for (unsigned char i = 0; i < 20; i++) {**

**b[yy[a][i]][xx[a][i]] = 10;**

**}**

**unsigned char sa, h;**

**sa = hnt - 20;**

**for (unsigned char i = 1; i < 8; i++) {**

**h = 0;**

**for (unsigned char j = 1; j < 9; j++) {**

**if (b[j - 1][i] == 10) h = h + 1;**

**if (h == 1 && b[j][i] != 10) b[j][i] = 3;**

**}**

**}**

**unsigned char k, i, j;**

**if (hnt % 2 == 0) {**

**for (unsigned char k = 20; k < 20 + sa / 2; k++) {**

**while (1) {**

**i = rand() % 9;**

**j = rand() % 4;**

**if (b[i][j] == 3) {**

**b[i][j] = 4;**

**b[i][8 - j] = 4;**

**yy[a][k] = i;**

**xx[a][k] = j;**

**yy[a][k + sa / 2] = i;**

**xx[a][k + sa / 2] = 8 - j;**

**break;**

**}**

**}**

**}**

**return;**

**}**

**else {**

**while (1) {**

**j = 4 + rand() % 4;**

**if (b[j][4] == 3) {**

**b[j][4] = 4;**

**yy[a][20] = j;**

**xx[a][20] = 4;**

**break;**

**}**

**}**

**if (hnt > 21) {**

**for (unsigned char i = 21; i < 21 + (hnt - 21) / 2; i++) {**

**unsigned char s, t;**

**while (1) {**

**s = rand() % 9;**

**t = rand() % 4;**

**if (b[s][t] == 3) {**

**b[s][t] = 4;**

**b[s][8 - t] = 4;**

**yy[a][i] = s;**

**xx[a][i] = t;**

**yy[a][i + (hnt - 21) / 2] = s;**

**xx[a][i + (hnt - 21) / 2] = 8 - t;**

**break;**

**}**

**}**

**}**

**}**

**}**

**}**

**void sudoku(void\* aa) {**

**unsigned char a = \*(unsigned char\*)aa;**

**srand(u - 19 \* (a + 1));**

**while (1) {**

**syokika(a);**

**int sentaku = rand() % 4;**

**if (sentaku == 0) sayu(a);**

**if (sentaku == 1) jyoge(a);**

**if (sentaku == 2) ten(a);**

**if (sentaku == 3) sayujyoge(a);**

**if (sentaku == 4) kokoro(a);**

**if (keizoku == 0)return;**

**cn[a] = 0;**

**f1(0, a);**

**if (keizoku == 0)return;**

**dainyu(a);**

**if (keizoku == 0)return;**

**cn[a] = 0;**

**krn[a] = 81 - hnt;**

**kaitosakusei(a);**

**//f(hnt, a);**

**if (cn[a] == 1) {**

**S = sentaku;**

**ht[a] = 1;**

**keizoku = 0;**

**return;**

**}**

**}**

**}**

**void dainyu(unsigned char a) {**

**for (unsigned char i = 0; i < hnt; i++) {**

**cm[a][yy[a][i]][xx[a][i]] = m[a][yy[a][i]][xx[a][i]];**

**}**

**}**

**void syokika(unsigned char a) {**

**for (unsigned char i = 0; i < 9; i++) {**

**for (unsigned char j = 0; j < 9; j++) {**

**m[a][i][j] = 0;**

**cm[a][i][j] = 0;**

**mx[a][i][j] = 9;**

**for (unsigned char k = 0; k < 9; k++) {**

**wb[a][i][j][k] = 0;**

**}**

**}**

**}**

**}**

**void nyuryokujyun(unsigned char g, unsigned char a) {**

**unsigned char ik, jk, mn = 100;**

**for (unsigned char i = 0; i < 9; i++) {**

**for (unsigned char j = 0; j < 9; j++) {**

**if (m[a][i][j] == 0) {**

**if (mx[a][i][j] <= mn) {**

**mx[a][i][j] = mn;**

**ik = i;**

**jk = j;**

**}**

**}**

**}**

**}**

**y[a][g] = ik;**

**x[a][g] = jk;**

**kyokusyokaiseki(ik, jk, a);**

**}**

**void f(unsigned char g, unsigned char a) {**

**unsigned char i, j, s, t, p, q, ii, iii, k;**

**unsigned char gy[9], r[9], b[9];**

**nyuryokujyun(g, a);**

**s = y[a][g];**

**t = x[a][g];**

**if (mx[a][s][t] == 0)return;**

**if (cn[a] > 1)return;**

**if (keizoku == 0)return;**

**for (i = 0; i < mx[a][s][t]; i++) {**

**m[a][s][t] = rlst[a][s][t][i];**

**for (j = 0; j < 9; j++) {**

**gy[j] = 0;**

**r[j] = 0;**

**b[j] = 0;**

**}**

**for (j = 0; j < 9; j++) {**

**if (m[a][s][j] == 0) {**

**if (wb[a][s][j][m[a][s][t] - 1] == 0) {**

**wb[a][s][j][m[a][s][t] - 1] = 1;**

**kyokusyokaiseki(s, j, a);**

**r[j] = 1;**

**}**

**}**

**}**

**for (j = 0; j < 9; j++) {**

**if (m[a][j][t] == 0) {**

**if (wb[a][j][t][m[a][s][t] - 1] == 0) {**

**wb[a][j][t][m[a][s][t] - 1] = 1;**

**kyokusyokaiseki(j, t, a);**

**gy[j] = 1;**

**}**

**}**

**}**

**for (j = 0; j < 9; j++) {**

**p = 3 \* (s / 3) + (j / 3);**

**q = 3 \* (t / 3) + (j % 3);**

**if (p != s && q != t) {**

**if (m[a][p][q] == 0) {**

**if (wb[a][p][q][m[a][s][t] - 1] == 0) {**

**wb[a][p][q][m[a][s][t] - 1] = 1;**

**kyokusyokaiseki(p, q, a);**

**b[j] = 1;**

**}**

**}**

**}**

**}**

**if (keizoku == 0)return;**

**if (g + 1 < 81) {**

**f(g + 1, a);**

**if (cn[a] > 1)return;**

**if (keizoku == 0)return;**

**}**

**else {**

**cn[a]++;**

**if (cn[a] == 1) {**

**for (j = 0; j < 9; j++) {**

**for (k = 0; k < 9; k++) {**

**ccm[a][j][k] = m[a][j][k];**

**}**

**}**

**}**

**if (cn[a] > 1)return;**

**if (keizoku == 0)return;**

**}**

**for (j = 0; j < 9; j++) {**

**if (r[j] == 1) {**

**wb[a][s][j][m[a][s][t] - 1] = 0;**

**}**

**if (gy[j] == 1) {**

**wb[a][j][t][m[a][s][t] - 1] = 0;**

**}**

**p = 3 \* (s / 3) + (j / 3);**

**q = 3 \* (t / 3) + (j % 3);**

**if (b[j] == 1) {**

**wb[a][p][q][m[a][s][t] - 1] = 0;**

**}**

**}**

**}**

**m[a][s][t] = 0;**

**return;**

**}**

**void f1(unsigned char g, unsigned char a) {**

**unsigned char i, j, s, t, p, q, ii, iii, k;**

**unsigned char gy[9], r[9], b[9];**

**if (g < hnt) {**

**s = yy[a][g];**

**t = xx[a][g];**

**kyokusyokaiseki(s, t, a);**

**}**

**else {**

**nyuryokujyun(g, a);**

**s = y[a][g];**

**t = x[a][g];**

**}**

**if (mx[a][s][t] == 0)return;**

**ii = rand() % mx[a][s][t];**

**if (cn[a] == 1)return;**

**if (keizoku == 0)return;**

**for (i = 0; i < mx[a][s][t]; i++) {**

**iii = (i + ii) % mx[a][s][t];**

**m[a][s][t] = rlst[a][s][t][iii];**

**for (j = 0; j < 9; j++) {**

**gy[j] = 0;**

**r[j] = 0;**

**b[j] = 0;**

**}**

**for (j = 0; j < 9; j++) {**

**if (m[a][s][j] == 0) {**

**if (wb[a][s][j][m[a][s][t] - 1] == 0) {**

**wb[a][s][j][m[a][s][t] - 1] = 1;**

**kyokusyokaiseki(s, j, a);**

**r[j] = 1;**

**}**

**}**

**}**

**for (j = 0; j < 9; j++) {**

**if (m[a][j][t] == 0) {**

**if (wb[a][j][t][m[a][s][t] - 1] == 0) {**

**wb[a][j][t][m[a][s][t] - 1] = 1;**

**kyokusyokaiseki(j, t, a);**

**gy[j] = 1;**

**}**

**}**

**}**

**for (j = 0; j < 9; j++) {**

**p = 3 \* (s / 3) + (j / 3);**

**q = 3 \* (t / 3) + (j % 3);**

**if (p != s && q != t) {**

**if (m[a][p][q] == 0) {**

**if (wb[a][p][q][m[a][s][t] - 1] == 0) {**

**wb[a][p][q][m[a][s][t] - 1] = 1;**

**kyokusyokaiseki(p, q, a);**

**b[j] = 1;**

**}**

**}**

**}**

**}**

**if (keizoku == 0)return;**

**if (g + 1 < hnt) {**

**f1(g + 1, a);**

**if (cn[a] == 1)return;**

**if (keizoku == 0)return;**

**}**

**else {**

**cn[a]++;**

**if (cn[a] == 1)return;**

**if (keizoku == 0)return;**

**}**

**for (j = 0; j < 9; j++) {**

**if (r[j] == 1) {**

**wb[a][s][j][m[a][s][t] - 1] = 0;**

**}**

**if (gy[j] == 1) {**

**wb[a][j][t][m[a][s][t] - 1] = 0;**

**}**

**p = 3 \* (s / 3) + (j / 3);**

**q = 3 \* (t / 3) + (j % 3);**

**if (b[j] == 1) {**

**wb[a][p][q][m[a][s][t] - 1] = 0;**

**}**

**}**

**}**

**m[a][s][t] = 0;**

**return;**

**}**

**void kyokusyokaiseki(unsigned char s, unsigned char t, unsigned char a) {**

**unsigned char i, w = 0;**

**for (i = 0; i < 9; i++) {**

**if (wb[a][s][t][i] == 0) {**

**rlst[a][s][t][w] = i + 1;**

**w++;**

**}**

**}**

**mx[a][s][t] = w;**

**}**

**unsigned char ks(unsigned char a) {**

**unsigned char p[9], s, t;**

**for (unsigned char i = 0; i < 9; i++) {**

**p[i] = 0;**

**for (unsigned char j = 0; j < 9; j++) {**

**for (unsigned char k = 0; k < 9; k++) {**

**p[m[a][j][k] - 1] = 1;**

**}**

**}**

**for (unsigned char j = 0; j < 9; j++) {**

**if (p[j] == 0)return(0);**

**}**

**}**

**for (unsigned char i = 0; i < 9; i++) {**

**p[i] = 0;**

**for (unsigned char j = 0; j < 9; j++) {**

**for (unsigned char k = 0; k < 9; k++) {**

**p[m[a][k][j] - 1] = 1;**

**}**

**}**

**for (unsigned char j = 0; j < 9; j++) {**

**if (p[j] == 0)return(0);**

**}**

**}**

**for (unsigned char i = 0; i < 9; i++) {**

**p[i] = 0;**

**for (unsigned char j = 0; j < 9; j++) {**

**for (unsigned char k = 0; k < 9; k++) {**

**s = 3 \* (i / 3) + (j / 3);**

**t = 3 \* (i % 3) + (j % 3);**

**p[m[a][s][t] - 1] = 1;**

**}**

**}**

**for (unsigned char j = 0; j < 9; j++) {**

**if (p[j] == 0)return(0);**

**}**

**}**

**return(1);**

**}**