§1 SETSET-RANDOM INTRO 1

(Downloaded from https://cs.stanford.edu/~knuth/programs.html and typeset on September 17, 2017)

1. Intro. This little program makes empirical tests by which I can check the accuracy of the SETSET program. (See that program for explanations.) #define m 12 /* size of each hand */ #define n 100000000 /* number of random trials */ #include <stdio.h> #include "gb_flip.h" /* use the Stanford GraphBase random number routines */ char deck [81]; char occ[81]; **char** $z[3][3] = \{\{0,2,1\},\{2,1,0\},\{1,0,2\}\}; /* x + y + z \equiv 0 \pmod{3} */$ **char** *third* [81][128]; main() register int j, k, t; int reps, count; $\langle \text{Initialize 2} \rangle$; while (1) { count = 0;for $(reps = 0; reps < n; reps \leftrightarrow)$ { $\langle \text{Shuffle the deck 4} \rangle$; $\langle \text{Increase } count \text{ if there are no SETs } 3 \rangle;$ $printf("%d/%d\n", count, n);$ } #define pack(a, b, c, d) (((a) * 3 + (b)) * 3 + (c)) * 3 + (d) $\langle \text{Initialize 2} \rangle \equiv$ $gb_init_rand(0)$; for (k = 0; k < 81; k++) deck[k] = k;for (k = 81 - m; k < 81; k++) occ[k] = 1;int a, b, c, d, e, f, g, h; for (a = 0; a < 3; a ++)for (b = 0; b < 3; b ++)for (c = 0; c < 3; c++)for (d = 0; d < 3; d++)for (e = 0; e < 3; e ++)for (f = 0; f < 3; f ++)for (g = 0; g < 3; g ++)for (h = 0; h < 3; h ++)third [pack (a, b, c, d)] [pack (e, f, g, h)] = pack (z[a][e], z[b][f], z[c][g], z[d][h]);

This code is used in section 1.

2 INTRO

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\S 3
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3. (Increase count if there are no SETs _3) \equiv
  for (j = 81 - m; j < 80; j ++)
     for (k = j + 1; k < 81; k ++)
        \textbf{if } (occ[third[deck[j]][deck[k]]]) \textbf{ goto } set\_found; \\
  count +\!\!+;
set\_found:
This code is used in section 1.
4. \langle Shuffle the deck 4\rangle
  for (j = 81; j > 81 - m; j --) {
     t = deck[j-1];
     occ[t] = 0;
     k = gb\_unif\_rand(j);
     deck[j-1] = deck[k];
     occ[deck[k]] = 1;
     deck[k] = t;
This code is used in section 1.
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 $\S 5$ Setset-random index 3

5. Index.

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a: <u>2</u>.
b: \quad \underline{\frac{2}{2}}.
c: \quad \underline{\frac{2}{2}}.
count: \underline{1}, \underline{3}.
d: \underline{2}.
deck: \underline{1}, \underline{2}, \underline{3}, \underline{4}.
e: \underline{2}.
f: \frac{\overline{2}}{\underline{2}}.
g: \underline{2}.
gb\_init\_rand: 2.
gb\_unif\_rand: 4.
h: \underline{2}.
j: \underline{1}.
k: \underline{1}.
m: \underline{1}.
main: \underline{1}.
n: \underline{1}.
occ: \underline{1}, \underline{2}, \underline{3}, \underline{4}.
pack: 2.
printf: 1.
reps: \underline{1}.
set\_found: \underline{3}.
t: \underline{\mathbf{1}}.
third: \underline{1}, \underline{2}, \underline{3}.
z: \underline{1}.
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4 NAMES OF THE SECTIONS

SETSET-RANDOM

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\begin{array}{ll} \left\langle \, \text{Increase} \,\, count \,\, \text{if there are no SETs 3} \, \right\rangle & \text{Used in section 1.} \\ \left\langle \, \text{Initialize 2} \, \right\rangle & \text{Used in section 1.} \\ \left\langle \, \text{Shuffle the deck 4} \, \right\rangle & \text{Used in section 1.} \end{array}
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SETSET-RANDOM

	Section	Page
Intro		1
Indev	5	•