

แบบฝึกหัดปฏิบัติการคานที่ 8: Recursive Function

ชื่อ-นามสกุล.....

รหัสประจำตัวนักเรียน.....

วันที่..... เดือน..... พ.ศ. 2564

Section.....

1. นายวากี ผูกเงิน 10,000 บาทไว้ในบัญชีออมทรัพย์ ที่ให้อัตราเบี้ย 5% ต่อปี สามปีจะเป็นเงินฝากเท่าไรไปทุกปี เมื่อเวลาผ่านไป 30 ปีเงินในบัญชีเงินฝากของนายวากีจะเป็นเท่าไร?

Hint

ให้ P_n แทนจำนวนเงินในบัญชีทั้งหมดจากเวลาผ่านไป n ปี เช่น P_0 ในสูตรของ P_{n-1}

$$\text{จะได้ } P_n = P_{n-1} + (0.05 \times P_{n-1}) = 1.05 \times P_{n-1}$$

$$\text{ตัวอย่าง } P_1 = (1.05)P_0$$

$$P_2 = (1.05)P_1 = (1.05)^2 P_0$$

$$P_3 = (1.05)P_2 = (1.05)^3 P_0$$

$$P_n = (1.05)^n P_0$$

2. สมมติว่า ในปี 2564 ประเทศไทยมีจำนวนคนอยู่ทั้งหมด 25 ล้านคนแล้ว ในทุกๆ ปี จำนวนคนจะสูงขึ้นไป 10% เมื่อถึงปี 2580 ประเทศไทยจะมีจำนวนคนอยู่เท่าไร

3. พังค์ชั่นเรียบเกิดที่เป็นตี่วุ้นที่รู้จักกันหนึ่งในรากน้ำมันนั้นคือเดลามาร์ กีอู บัลลูห์ของ Leonardo Bonacci ซึ่งรู้จักกันในชื่อ Fibonacci โดย Fibonacci ให้ทับบัญชาเรียนนี้

การคำนวณตามที่เพิ่งได้กล่าวมา คือ $F_0 = 0, F_1 = 1$ และ $F_n = F_{n-1} + F_{n-2}$ สำหรับ $n > 1$ นั่นหมายความว่า $F_2 = F_1 + F_0 = 1 + 0 = 1$, $F_3 = F_2 + F_1 = 1 + 1 = 2$, $F_4 = F_3 + F_2 = 2 + 1 = 3$, $F_5 = F_4 + F_3 = 3 + 2 = 5$, $F_6 = F_5 + F_4 = 5 + 3 = 8$, $F_7 = F_6 + F_5 = 8 + 5 = 13$, $F_8 = F_7 + F_6 = 13 + 8 = 21$, $F_9 = F_8 + F_7 = 21 + 13 = 34$, $F_{10} = F_9 + F_8 = 34 + 21 = 55$, $F_{11} = F_{10} + F_9 = 55 + 34 = 89$, $F_{12} = F_{11} + F_{10} = 89 + 55 = 144$, $F_{13} = F_{12} + F_{11} = 144 + 89 = 233$, $F_{14} = F_{13} + F_{12} = 233 + 144 = 377$, $F_{15} = F_{14} + F_{13} = 377 + 233 = 610$, $F_{16} = F_{15} + F_{14} = 610 + 377 = 987$, $F_{17} = F_{16} + F_{15} = 987 + 610 = 1597$, $F_{18} = F_{17} + F_{16} = 1597 + 987 = 2584$, $F_{19} = F_{18} + F_{17} = 2584 + 1597 = 4181$, $F_{20} = F_{19} + F_{18} = 4181 + 2584 = 6765$, $F_{21} = F_{20} + F_{19} = 6765 + 4181 = 10946$, $F_{22} = F_{21} + F_{20} = 10946 + 6765 = 17711$, $F_{23} = F_{22} + F_{21} = 17711 + 10946 = 28657$, $F_{24} = F_{23} + F_{22} = 28657 + 17711 = 46368$, $F_{25} = F_{24} + F_{23} = 46368 + 28657 = 75025$, $F_{26} = F_{25} + F_{24} = 75025 + 46368 = 121393$, $F_{27} = F_{26} + F_{25} = 121393 + 75025 = 196418$, $F_{28} = F_{27} + F_{26} = 196418 + 121393 = 317811$, $F_{29} = F_{28} + F_{27} = 317811 + 196418 = 514229$, $F_{30} = F_{29} + F_{28} = 514229 + 317811 = 832040$, $F_{31} = F_{30} + F_{29} = 832040 + 514229 = 1346269$, $F_{32} = F_{31} + F_{30} = 1346269 + 832040 = 2178309$, $F_{33} = F_{32} + F_{31} = 2178309 + 1346269 = 3524578$, $F_{34} = F_{33} + F_{32} = 3524578 + 2178309 = 5702887$, $F_{35} = F_{34} + F_{33} = 5702887 + 3524578 = 9227465$, $F_{36} = F_{35} + F_{34} = 9227465 + 5702887 = 14930352$, $F_{37} = F_{36} + F_{35} = 14930352 + 9227465 = 24157817$, $F_{38} = F_{37} + F_{36} = 24157817 + 14930352 = 39088169$, $F_{39} = F_{38} + F_{37} = 39088169 + 24157817 = 63245986$, $F_{40} = F_{39} + F_{38} = 63245986 + 39088169 = 102334155$, $F_{41} = F_{40} + F_{39} = 102334155 + 63245986 = 165579141$, $F_{42} = F_{41} + F_{40} = 165579141 + 102334155 = 267913296$, $F_{43} = F_{42} + F_{41} = 267913296 + 165579141 = 433492437$, $F_{44} = F_{43} + F_{42} = 433492437 + 267913296 = 691405733$, $F_{45} = F_{44} + F_{43} = 691405733 + 433492437 = 1124898170$, $F_{46} = F_{45} + F_{44} = 1124898170 + 691405733 = 1816303903$, $F_{47} = F_{46} + F_{45} = 1816303903 + 1124898170 = 2941202073$, $F_{48} = F_{47} + F_{46} = 2941202073 + 1816303903 = 4757505976$, $F_{49} = F_{48} + F_{47} = 4757505976 + 2941202073 = 7700000000$, $F_{50} = F_{49} + F_{48} = 7700000000 + 4757505976 = 12457505976$, $F_{51} = F_{50} + F_{49} = 12457505976 + 7700000000 = 19757505976$, $F_{52} = F_{51} + F_{50} = 19757505976 + 12457505976 = 32215011952$, $F_{53} = F_{52} + F_{51} = 32215011952 + 19757505976 = 51972517928$, $F_{54} = F_{53} + F_{52} = 51972517928 + 32215011952 = 84187529880$, $F_{55} = F_{54} + F_{53} = 84187529880 + 51972517928 = 136160047808$, $F_{56} = F_{55} + F_{54} = 136160047808 + 84187529880 = 220347577688$, $F_{57} = F_{56} + F_{55} = 220347577688 + 136160047808 = 356507625496$, $F_{58} = F_{57} + F_{56} = 356507625496 + 220347577688 = 576855103184$, $F_{59} = F_{58} + F_{57} = 576855103184 + 356507625496 = 933362728680$, $F_{60} = F_{59} + F_{58} = 933362728680 + 576855103184 = 1510217831864$, $F_{61} = F_{60} + F_{59} = 1510217831864 + 933362728680 = 2443580560544$, $F_{62} = F_{61} + F_{60} = 2443580560544 + 1510217831864 = 3953798392408$, $F_{63} = F_{62} + F_{61} = 3953798392408 + 2443580560544 = 6397378952952$, $F_{64} = F_{63} + F_{62} = 6397378952952 + 3953798392408 = 10351177345360$, $F_{65} = F_{64} + F_{63} = 10351177345360 + 6397378952952 = 16748556298312$, $F_{66} = F_{65} + F_{64} = 16748556298312 + 10351177345360 = 27109733643672$, $F_{67} = F_{66} + F_{65} = 27109733643672 + 16748556298312 = 43858289941984$, $F_{68} = F_{67} + F_{66} = 43858289941984 + 27109733643672 = 70968023585656$, $F_{69} = F_{68} + F_{67} = 70968023585656 + 43858289941984 = 114826313527640$, $F_{70} = F_{69} + F_{68} = 114826313527640 + 70968023585656 = 185794337113296$, $F_{71} = F_{70} + F_{69} = 185794337113296 + 114826313527640 = 300620650640936$, $F_{72} = F_{71} + F_{70} = 300620650640936 + 185794337113296 = 486414987754232$, $F_{73} = F_{72} + F_{71} = 486414987754232 + 300620650640936 = 787035638395168$, $F_{74} = F_{73} + F_{72} = 787035638395168 + 486414987754232 = 1273450626149400$, $F_{75} = F_{74} + F_{73} = 1273450626149400 + 787035638395168 = 2060486264544568$, $F_{76} = F_{75} + F_{74} = 2060486264544568 + 1273450626149400 = 3333936890693968$, $F_{77} = F_{76} + F_{75} = 3333936890693968 + 2060486264544568 = 5394423155238536$, $F_{78} = F_{77} + F_{76} = 5394423155238536 + 3333936890693968 = 8728359045932504$, $F_{79} = F_{78} + F_{77} = 8728359045932504 + 5394423155238536 = 14122782191171040$, $F_{80} = F_{79} + F_{78} = 14122782191171040 + 8728359045932504 = 22851141237103544$, $F_{81} = F_{80} + F_{79} = 22851141237103544 + 14122782191171040 = 36973923428276584$, $F_{82} = F_{81} + F_{80} = 36973923428276584 + 22851141237103544 = 59825064665370128$, $F_{83} = F_{82} + F_{81} = 59825064665370128 + 36973923428276584 = 96799088093646712$, $F_{84} = F_{83} + F_{82} = 96799088093646712 + 59825064665370128 = 156624152758916840$, $F_{85} = F_{84} + F_{83} = 156624152758916840 + 96799088093646712 = 253423240852563552$, $F_{86} = F_{85} + F_{84} = 253423240852563552 + 156624152758916840 = 410047393611480392$, $F_{87} = F_{86} + F_{85} = 410047393611480392 + 253423240852563552 = 663470634463943944$, $F_{88} = F_{87} + F_{86} = 663470634463943944 + 410047393611480392 = 1073517028075424336$, $F_{89} = F_{88} + F_{87} = 1073517028075424336 + 663470634463943944 = 1736987662539368280$, $F_{90} = F_{89} + F_{88} = 1736987662539368280 + 1073517028075424336 = 2810504690614792616$, $F_{91} = F_{90} + F_{89} = 2810504690614792616 + 1736987662539368280 = 4547492353154160896$, $F_{92} = F_{91} + F_{90} = 4547492353154160896 + 2810504690614792616 = 7357996043768953512$, $F_{93} = F_{92} + F_{91} = 7357996043768953512 + 4547492353154160896 = 11895488396923114408$, $F_{94} = F_{93} + F_{92} = 11895488396923114408 + 7357996043768953512 = 19253484440692067920$, $F_{95} = F_{94} + F_{93} = 19253484440692067920 + 11895488396923114408 = 31148972837615182328$, $F_{96} = F_{95} + F_{94} = 31148972837615182328 + 19253484440692067920 = 50392457278307249656$, $F_{97} = F_{96} + F_{95} = 50392457278307249656 + 31148972837615182328 = 81541429115922431984$, $F_{98} = F_{97} + F_{96} = 81541429115922431984 + 50392457278307249656 = 131933886394229681640$, $F_{99} = F_{98} + F_{97} = 131933886394229681640 + 81541429115922431984 = 213475315509152113624$, $F_{100} = F_{99} + F_{98} = 213475315509152113624 + 131933886394229681640 = 345409199903381795264$

Input บรรทัดแรกเป็นตัวเลข n เดือน

Output บรรทัดแรกเป็นผลลัพธ์ บรรทัดที่ n เป็นตัวเลข

Input	Output
5	5

4. จงเขียนโปรแกรมภาษา C โดยการใช้ความสัมพันธ์แบบเวียนเกิดเพื่อหาผลบวกของตัวเลข n ตัวแรก

ตัวอย่างผลลัพธ์โปรแกรม

Input บรรทัดแรกเป็นตัวเลข n

Output บรรทัดแรกเป็นผลลัพธ์ ของการบวก $1+2+3+\dots+n$

Input	Output
5	15

```
# include <stdio.h>
# include <stdlib.h>
# include <math.h>

int main(){
    int i,sum=0,n;
    Output
    scanf("%i",&n);
    for(i=1;i<=n;i++){
        sum += i;
    }
    printf("%i",sum);
    return 0;
}
```