**Chương 1**

//Bai 1

#include <iostream>

using namespace std;

// Cau a

int a (int n){

if (n==1)

return n;

return n+ a(n-1);

}

// Cau b

int b(int n){

if (n==1)

return n;

return n\*n+ b(n-1);

}

//Cau c

int c(int n){

if (n==1)

return 1;

return n\*c(n-1);

}

int sum(int n){

if (n==1) return 1;

return c(n)+ sum (n-1);

}

//Cau d

long long d(int s, int e) {

if (s > e) return 1;

return s \* d(s + 1, e);

}

long long sum2(int n) {

if (n == 1) return 2;

return d(n, 2\*n) + sum2(n - 1);

}

int main (){

int n; cin >> n;

//cau a

int m= a(n);

cout << m << endl;

//cau b

int l= b(n);

cout << l << endl;

//cau c

int q= sum(n);

cout << q << endl;

//cau d

int p= sum2 (n);

cout << p << endl;

return 0;

}

//Bai 2

#include <bits/stdc++.h>

using namespace std;

//cau a

int a(int n){

if (n==1 || n==2)

return 1;

else

return a(n-1)+(n-1)\*a(n-2);

}

//cau b

int b(int n) {

if (n == 1 || n == 2) {

return 1;

}

int c = 1; //a(n-1)

int d = 1; //a(n-2)

int sum = 0;

for (int i = 3; i <= n; ++i) {

sum = c + (i - 1) \* d;

d = c;

c = sum;

}

return sum;

}

int main() {

//cau a

cout << a(7) << endl;

int n; cin >> n;

//cau b

cout << a(n) << endl;

//cau c

cout << b(n);

return 0;

}

//Bai 3

#include <iostream>

using namespace std;

//tinh cac gia tri trong tam giac

int pascal(int k, int n) {

if (n == 0 || n == k)

return 1;

else

return pascal(k - 1, n - 1) + pascal(k - 1, n);

}

//in cac khoang trang

void inspace(int m) {

if (m == 0)

return;

cout << " ";

inspace(m - 1);

}

//in cac so tren hang

void inso(int k, int n) {

if (n > k)

return;

cout << pascal(k, n) << " ";

inso(k, n + 1);

}

//in ra tam giac

void intg(int k, int h) {

if (k == h)

return;

//in khoang trang

inspace(h - k - 1);

//in cac so tren hang

inso(k, 0);

cout << endl;

// in hang tiep theo

intg(k + 1, h);

}

int main() {

//k hang, n cot, chieu cao h

int h;

cout << "Nhap chieu cao cua tam giac Pascal: ";

cin >> h;

intg(0, h);

return 0;

}

//Bai 4

#include <bits/stdc++.h>

using namespace std;

//Cau a

float F(float n){

if (n==1.0 ||n==2.0)

return 1.0;

return F(n-2)+ F(n-1);

}

float S(int n) {

if (n == 1)

return 1.0 / (1.0 + F(1));

return n / (1.0 + F(n)) + S(n-1);

}

//Cau b

float f(float n) {

float fi=1.0;

float se=1.0;

float to;

if (n==1|| n==2)

return 1;

for (int i=3; i<=n; i++){

to= fi+se;

fi=se;

se=to;

}

return to;

}

float s(float n){

float total= 0.0;

for (int i=0; i<= n; i++){

total += i / (1.0 + f(i));

}

return total;

}

int main(){

float n; cin >> n;

cout << S(n);

cout << "\n";

cout << s(n);

return 0;

}

//Bai 5

#include <bits/stdc++.h>

using namespace std;

int x(int n){

if (n==1) // dieu kien dung cua ham de quy

return 1;

if (n==2) // dieu kien dung

return 2;

return n\*(x(n-1)+(x(n-1))/(n-1)); // cong thuc de quy

}

int main(){

int n; cin >> n;

cout << x(n);

return 0;

}

//Bai 6

#include<iostream>

using namespace std;

int x(int n, int i= 0, int total= 0){

if(n == 1 || n == 0) // dieu kien dung cua ham de quy

return 1;

else{

if (i== n){ // dieu kien dung cua chuong trinh tinh tong

return total;

}

total += (n - i) \* x(i); //tinh theo cong thuc de quy

return x (n, i+1, total); //tang i tinh gia tri

}

return 0; //khong thoa dieu kien

}

int main(){

int n;

cout << "x" << 7 << " = " << x(7) << endl;

cout << "n= ";

cin >> n;

cout << "x" << n << " = " << x(n) << endl;

}

//Bai 7

#include <bits/stdc++.h>

using namespace std;

void nhap (int a[], int n){

for (int i=0; i< n; i++){

cin >> a[i];

}

}

//Cau a

int total (int a[], int n){

if (n== 0)

return a[0];

return a[n]+ total(a, n-1);

}

//Cau b

int daundmax (int a[], int n){

if (n==1)

return a[0];

if (a[n-1]> daundmax (a, n-1))

return a[n-1];

return daundmax (a, n-1);

}

//Cau c

int ktnt (int n, int dau, int cuoi){

if (n<= 1) return false;

if (cuoi< dau)

return 1;

if (n%dau==0)

return 0;

return ktnt (n, dau+1, cuoi);

}

int sont (int n){

return ktnt (n, 2, sqrt(n));

}

int count(int a[], int n, int i){

if (i==n)

return 0;

return sont(a[i]) + count(a, n, i+ 1);

}

int main(){

int n; cin >> n;

int a[n];

cout << "Nhap mang \n";

nhap (a, n);

//Cau a

cout << "Cau a\n";

cout << "Tong cua mang la "<< total (a, n) << endl;

//Cau b

cout << "Cau b\n";

cout << "Gia tri lon nhat mang la " << daundmax(a, n) << endl;

//Cau c

cout << "Cau c\n";

cout << "So luong so nguyen to la "<< count (a, n, 0);

return 0;

}

//Bai 8

#include <iostream>

using namespace std;

//tinh cac gia tri trong tam giac

int pascal(int k, int n) {

if (n == 0 || n == k)

return 1;

else

return pascal(k - 1, n - 1) + pascal(k - 1, n);

}

//in cac khoang trang

void inspace(int m) {

if (m == 0)

return;

cout << " ";

inspace(m - 1);

}

//in cac so tren hang

void inso(int k, int n) {

if (n > k)

return;

cout << pascal(k, n) << " ";

inso(k, n + 1);

}

//in ra tam giac

void intg(int k, int h) {

if (k == h)

return;

//in khoang trang

inspace(h - k - 1);

//in cac so tren hang

inso(k, 0);

cout << endl;

// in hang tiep theo

intg(k + 1, h);

}

int main() {

//k hang, n cot, chieu cao h

int h;

cout << "Nhap chieu cao cua tam giac Pascal: ";

cin >> h;

intg(0, h);

return 0;

}

**Chương 4**

//Bai 1

#include <bits/stdc++.h>

using namespace std;

//nhap mang so nguyen

void enter (int a[], int n){

for (int i=0; i<n; i++){

cin >> a[i];

}

}

//ham xuat mang

void print (int a[], int n){

for (int i=0; i<n; i++){

cout << a[i] << " ";

}

cout << endl;

}

//Kiem tra so nguyen to

bool isprimes (int n){

if (n< 2)

return false;

for (int i=2; i< n; i++){

if (n%i==0)

return false;

}

return true;

}

//dem so nguyen to

int countprimes (int a[], int n){

int cnt=0;

for (int i=0; i< n; i++){

if (isprimes(a[i])){

cnt++;

}

}

return cnt;

}

// doi cho phan tu

void swap (int &a, int &b){

int temp= a;

a=b;

b=temp;

}

//ham sap xep

void sort(int arr[], int n)

{

int i, j;

bool swapped;

for (i = 0; i < n - 1; i++) {

swapped = false;

for (j = 0; j < n - i - 1; j++) {

if (arr[j] > arr[j + 1]) {

swap(arr[j], arr[j + 1]);

swapped = true;

}

}

if (swapped == false)

break;

}

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\NUM.INP", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\NUM.OUT", "w", stdout);

int n;

cin >> n;

int a[n];

enter(a, n);

cout << countprimes(a, n)<< endl;

sort(a, n);

print(a, n);

return 0;

}

//Bai 2

#include <bits/stdc++.h>

using namespace std;

int a[100],kq[100], n, kt, m;

#define Sn for(int i=0; i< n; i++)

//nhap mang so nguyen

void enter (){

for (int i=0; i<n; i++){

cin >> a[i];

}

}

//ham xuat mang

void print (){

for (int i=0; i<n; i++){

cout << a[i] << " ";

}

cout << endl;

}

//cau a) gia tri lon nhat

int findmax (){

int max= 0;

Sn{

if (max < a[i]){

max= a[i];

}

}

return max;

}

//cau b)

//gia tri lon nhat giua 2 so

int max(int a, int b) {

return (a > b) ? a : b;

}

//do dai cua chuoi con tang dan dai nhat

int daycon() {

int dainhat = 0; // do dai day con tang dai nhat

int dodaichuoicon = 0; //do dai day con tang hien tai

Sn {

if (a[i] <= a[i+ 1]) {

dodaichuoicon++; // tang chieu dai

} else if (dodaichuoicon > dainhat){ //cap nhat do dai dai nhat

dainhat= dodaichuoicon;

dodaichuoicon = 1; //khi khong thoa a[i] <= a[i+ 1]

}

}

return dainhat;

}

//cau c

//dem so cap x y co tong bang m

void demtongbangm() {

int count = 0;

bool apped[1000][1000] = {false}; // danh dau da xuat hien cap (x, y)

for (int i = 0; i < n; i++) {

for (int j = i + 1; j < n; j++) {

if (a[i] + a[j] == m || a[j] + a[i] == m) {

if (!apped[a[i]][a[j]] && !apped[a[j]][a[i]]) {

count++;

apped[a[i]][a[j]] = true;

apped[a[j]][a[i]] = true;

}

}

}

}

cout << count;

}

//cau d

//sap xep

void sort (){

int i, j;

bool swapped;

for (i=0; i<n-1; i++){

swapped= false;

for (j=0; j< n-i-1; j++){

if (a[j] > a[j+1])

swap (a[j], a[j+1]);

swapped= true;

}

if (swapped == false){

break;

}

}

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\NUM.INP", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\NUM.OUT", "w", stdout);

cin >> n;

enter ();

//Cau a

cout << findmax() << endl;

//Cau b

cout << daycon() << endl;

//Cau c

cin >> m;

demtongbangm ();

//Cau d

sort();

cout << endl << a[n/2];

return 0;

}

//Bai 3

#include <bits/stdc++.h>

using namespace std;

int a[100][100], b[100], c[100], m, n, k;

//Nhap mang

void nhap(){

for(int i=0; i<m; i++){

for (int j=0; j< n; j++){

cin >> a[i][j];

}

}

}

//xuat mang

void xuat(){

for(int i=0; i<m; i++){

for (int j=0; j< n; j++){

cout << a[i][j] << " ";

}

cout << endl;

}

}

//cau a

//kiem tra so nguyen to

bool isprimes (int n){

if (n< 2){

return false;

}

for (int i=2; i< n; i++){

if (n%i==0)

return false;

}

return true;

}

//dem so nguyen to

int demprimes (){

int count= 0;

for (int i= 0; i< m; i++){

for (int j= 0; j< n; j++){

if (isprimes(a[i][j])){

count++;

}

}

}

return count;

}

//cau b

//tong cac phan tu cua dong

void tongdong() {

for (int i = 0; i < m; i++) {

int sum = 0; // Reset sum for each row

for (int j = 0; j < n; j++) {

sum += a[i][j];

}

b[i] = sum; // Store the sum for each row in array b

}

}

void maxdong () {

int max= b[0];

for (int i=0; i< m; i++){

if (b[i]> max){

max= b[i];

}

}

cout << max << endl;

}

//cau c

//tinh tong cot

void tongcot() {

for (int i = 0; i < n; i++) {

int sumcot = 0;

for (int j = 0; j < m; j++) {

sumcot += a[j][i];

}

c[i] = sumcot;

}

}

//min cot

void mincot () {

int min= c[0];

for (int i=0; i< n; i++){

if (c[i]< min){

min= c[i];

}

}

cout << min << endl;

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-3-4\\table.inp", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-3-4\\table.out", "w", stdout);

cin >> m >> n;

nhap ();

//cau a

int cnt= demprimes ();

cout << cnt << endl;

//cau b

tongdong();

maxdong();

//cau c

tongcot();

mincot();

return 0;

}

//Bai 4

#include <bits/stdc++.h>

using namespace std;

int a[100][100], b[100], m, n;

//Nhap mang

void nhap(){

for(int i=0; i<m; i++){

for (int j=0; j< n; j++){

cin >> a[i][j];

}

}

}

//xuat mang

void xuat(){

for(int i=0; i<m; i++){

for (int j=0; j< n; j++){

cout << a[i][j] << " ";

}

cout << endl;

}

}

//cau a

//tim phan tu lon nhat

int findmax () {

int max= INT\_MIN;

int count= 0;

for (int i=0; i< m; i++){

int j;

for (j=0; j< n; j++){

if (max<= a[i][j])

max= a[i][j];

}

}

return max;

}

//dem so luong phan tu bang max

int dem(){

int max= findmax();

int count= 0;

for(int i=0; i< m; i++){

for (int j=0; j< n; j++){

if (a[i][j]== max){

count++;

}

}

}

return count; // coi phan tu dau tien tim duoc bang max chinh la max-> khong dem

}

//cau b

//tinh tong cot

void tongcot() {

for (int i = 0; i < n; i++) {

int sumcot = 0;

for (int j = 0; j < m; j++) {

sumcot += a[j][i];

}

cout << sumcot << " ";

}

cout << endl;

}

//cau c

//kiem tra so nguyen to

bool isprimes (int n){

if (n< 2)

return false;

for (int i=2; i< sqrt(n); i++){

if (n%i==0)

return false;

}

return true;

}

void timmax (){

int sum;

for (int i=0; i< m; i++){

sum= 0; // khoi tao gia tri va tra tong ve 0 khi tinh tong hinh vuong tiep theo

for (int j=0; j< n; j++){

if (isprimes(a[i][j])&& isprimes(a[i][j+1])&& isprimes(a[i+1][j+1])&& isprimes(a[i+1][j])){ // neu phan tu cua hinh vuong la so nguyen to

sum= a[i][j]+a[i][j+1]+a[i+1][j]+a[i+1][j+1]; // tong cac phan tu cua hinh vuong

b[i]= sum; // day tong vao chuoi de so sanh tim max

}

}

}

//tim tong lon nhat

int max= b[0];

for (int i=1; i< m; i++){

if (max< b[i]){

max= b[i];

}

}

cout << max;

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-3-4\\table.inp", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-3-4\\table.out", "w", stdout);

cin >> m >> n;

nhap ();

//cau a

cout << findmax() << " " << dem() << endl;

//cau b

tongcot();

//cau c

timmax();

return 0;

}

//Bai 5

#include <bits/stdc++.h>

using namespace std;

int a[100][100], b[100], m, n;

//Nhap mang

void nhap(){

for(int i=0; i<m; i++){

for (int j=0; j< n; j++){

cin >> a[i][j];

}

}

}

//xuat mang

void xuat(){

for(int i=0; i<m; i++){

for (int j=0; j< n; j++){

cout << a[i][j] << " ";

}

cout << endl;

}

}

//cau a

void timmin (){

//tim phan tu nho nhat

for (int i=0; i< m; i++){

int min= INT\_MAX; // gan min= gia tri lon nhat

for (int j=0; j< n; j++){

if (min> a[i][j]){

min= a[i][j];

}

}

b[i]= min; // dua min vao b[i]

}

//tim phan tu lon nhat trong cac phan tu nho nhat

int max= INT\_MIN; //gan max= gia tri nho nhat

for (int i= 0; i< m; i++){

if (max< b[i]){

max= b[i];

}

}

cout << max << endl;

}

//cau b

void timvitrinhonhat() {

int khoangcachnhonhat = INT\_MAX; //khoang cach nho nhat

int i1, j1, i2, j2; //vi tri 2 diem co khaong cach nho nhat

for(int i = 0; i < m; i++) {

for(int j = 0; j < n; j++) {

//so sanh voi cac phan tu con lai trong cung hang

for(int l = j + 1; l < n; l++) {

int khoang\_cach = abs(a[i][j] - a[i][l]);

if(khoangcachnhonhat > khoang\_cach) {

khoangcachnhonhat = khoang\_cach;

i1 = i; j1 = j; i2 = i; j2 = l;

}

}

//so sanh voi cac han ben duoi

for(int k = i + 1; k < m; k++) {

for(int l = 0; l < n; l++) {

int khoang\_cach = abs(a[i][j] - a[k][l]);

if(khoangcachnhonhat > khoang\_cach) {

khoangcachnhonhat = khoang\_cach;

i1 = i; j1 = j; i2 = k; j2 = l;

}

}

}

}

}

cout << khoangcachnhonhat << " " << i1 + 1 << " " << j1 + 1 << " " << i2 + 1 << " " << j2 + 1 << endl;

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-5-6\\TABLE.INP", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-5-6\\TABLE.OUT", "w", stdout);

cin >> m >> n;

nhap ();

cout << "CAU a: ";

timmin();

cout << "CAU b: ";

timvitrinhonhat();

return 0;

}

//Bai 6

#include <bits/stdc++.h>

using namespace std;

int a[100][100], k[100], b[100][100], c[100][100], d[100], e[100], m, n;

void nhap (){

for (int i=0; i< m; i++){

for (int j=0; j< n; j++){

cin >> a[i][j];

}

}

}

//cau a

void findsum () {

for (int i=0; i< m; i++){

int min= a[0][0];

for (int j=1; j< n; j++){

if (a[i][j]< min){

min= a[i][j];

}

}

k[i]= min;

}

int sum= 0;

for (int i=0; i< m; i++){

for (int j= 0; j< n; j++){

b[i][j]= a[i][j]\* k[i];

sum+= b[i][j];

}

}

cout << sum << endl;

}

//cau b

//kiem tra so nguyen toii

bool snt (int n){

if (n< 2)

return false;

for (int i=2; i<= sqrt(n); i++){

if (n%i== 0)

return false;

}

return true;

}

//chuyen ve so nguyen to truoc num

int truoc (int num){

if (num< 2){

return 2;

}

for (int i = num - 1; i > 1; i--) {

bool isprime = true;

for (int j = 2; j <= sqrt(i); j++) {

if (i % j == 0) {

isprime = false;

break;

}

}

if (isprime) {

return i;

}

}

return 1; // Neu khong tim thay so nguyen nho hon

}

//chuyen ve so nguyen to sau num

int sau (int num){

for (int i = num + 1; ; i++) {

bool isprime = true;

for (int j = 2; j <= sqrt(i); j++) {

if (i % j == 0) {

isprime = false;

break;

}

}

if (isprime) {

return i;

}

}

}

//kiem tra khoang cach tu num toi so truoc va so sau coi so nao lon hon va tra ve theo dieu kien

int check (int num){

int be = truoc(num);

int af = sau(num);

if (num - be <= af - num) {

return be;

} else {

return af;

}

}

//chuyen doi va in ra mang

void chuyen (){

int sum= 0;

for (int i=0; i< m; i++){

for (int j=0; j< n; j++){

c[i][j]= check(a[i][j]);

sum+= c[i][j];

}

}

cout<< sum << endl;

}

//cau c

// max dong, min cot

void cauc() {

int x, y; // luu toa do phan tu yen ngua

int maxdong;

for (int i=0; i< m; i++){ // tim max dong

maxdong= a[i][0];

for (int j= 1; j< n; j++){

if (a[i][j]> maxdong){

maxdong= a[i][j];

}

}

d[i]= maxdong; // day maxdong vao d

}

for (int i=0; i< n; i++){ // tim min cot

int mincot= a[0][i];

for (int j= 1; j< m; j++){

if (mincot> a[j][i]){

mincot= a[j][i];

}

}

e[i]= mincot; //day mincot vao e

}

//tim va in ra phan tu yen ngua

for (int i=0; i< m; i++){

for (int j=0; j< m; j++){

if (d[i]== e[j]){

x= i;

y= j;

cout << e[j] << " " << x+1 << " " << y+1;

break;

}

}

}

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-5-6\\TABLE.INP", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-5-6\\TABLE.OUT", "w", stdout);

cin >> m >> n;

nhap();

//cau a

cout << "CAU a: ";

findsum();

//cau b

cout << "CAU b: ";

chuyen ();

//cau c

cout << "CAU c: ";

cauc();

return 0;

}

//Bai 7

#include <iostream>

using namespace std;

string s;

void demkitu () {

int dem[256]= {0}; //luu so lan xuat hien cua phan tu

for (int i= 0; i< s.length(); i++){

if (s[i]== ' '){

continue; //neu la ki tu trong thi chuyen sang lan lap tiep theo

}

dem[s[i]]++; // tang so lan xuat hien cua ki tu s[i]

}

//in ra ki tu thu i va so lan xuat hien cua no

for (int i= 0; i< 256; i++){

if (dem[i]!= 0){

cout << char(i) << " " << dem[i] << " ";

}

}

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-7\\input.txt", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-7\\output.txt", "w", stdout);

getline (cin, s);

demkitu();

return 0;

}

//Bai 8

#include <bits/stdc++.h>

using namespace std;

struct Ps {

int tu;

int mau;

};

void nhap (Ps\* ps, int n) {

for (int i=0; i< n; i++){

cin >> ps[i].tu;

cin >> ps[i].mau;

}

}

//cau a

//dem phan so nho hon 1

void caua (Ps\* ps, int n){

int count= 0;

for (int i= 0; i< n; i++){

if (ps[i].tu/ps[i].mau< 1){

count++;

}

}

cout << count << endl;

}

//cau b

//dem so phan so tu chia het cho mau

void caub (Ps\* ps, int n){

int count= 0;

for (int i=0; i< n; i++){

if (ps[i].tu%ps[i].mau== 0){

count++;

}

}

cout << count << endl;

}

//cau c

//kiem tra so nguyen to

bool isprime(int n){

if (n< 2){

return false;

}

for (int i=2; i<= sqrt(n); i++){

if (n%i==0)

return false;

}

return true;

}

//dem so phan so tu va mau so deu la so nguyen to

int cauc (Ps\* ps, int n){

int count= 0;

bool found;

for (int i=0; i< n; i++){

if (isprime (ps[i].tu)){

found= true;

if (!isprime(ps[i].mau)){

found= false;

}

if (found== true){

count++;

}

}

}

return count;

}

//cau d

//phan so co gia tri lon nhat

void phansomax (Ps\* ps, int n){

float maxps= 0.0; // gia tri lon nhat

int x; // luu toa do phan so

for (int i=0; i< n; i++){

float thuong= float (ps[i].tu)/ ps[i].mau;

if (maxps < thuong){

maxps= thuong;

x= i;

}

}

cout << ps[x].tu << "/" << ps[x].mau << endl;

}

//cau e

//phan so nho hon 1 lon nhat

void phanson1max (Ps\* ps, int n){

float max= 0.0; // gia tri lon nhat

int x= 0; //toa do phan so lon nhat

for (int i= 0; i< n; i++){

if (ps[i].tu/ ps[i].mau< 1&& max < float (ps[i].tu)/ ps[i].mau){

max= float (ps[i].tu)/ ps[i].mau; //cap nhat gia tri cua max

x= i; //cap nhat toa do phan so lon nhat

}

}

cout << ps[x].tu << "/" << ps[x].mau << " ";

}

//phan so lon hon 1 nho nhat

void phansol1min (Ps\* ps, int n){

float min= INT\_MAX; //gia tri nho nhat

int y= 0; //toa do phan tu gia tri nho nhat

for (int i= 0;i< n; i++){

if (ps[i].tu/ps[i].mau >= 1 && float (ps[i].tu)/ps[i].mau< min){

min= float (ps[i].tu)/ ps[i].mau; //cap nhat gia tri nho nhat

y= i; // cap nhat toa do gia tri nho nhat

}

}

cout << ps[y].tu << "/" << ps[y].mau << endl;

}

//cau f

// tim uoc chung lon nhat

int ucln (int &a, int &b){

if (a== 0|| b== 0){

return a+b;

}

while (a != b){

if (a> b){

a= a-b;

} else {

b= b-a;

}

}

return a;

}

//dem phan so toi gian

void demphansotoigian (Ps\* ps, int n){

int count= 0;

for (int i= 0; i< n; i++){

//ucln la 1 tuc la hai phan so da toi gian

if (ucln (ps[i].tu, ps[i].mau) == 1 ||ucln (ps[i].tu, ps[i].mau)== 1){

count++;

}

}

cout << count << endl;

}

//cau g

//tinh trung binh cong

float trbcong(Ps ps[],int n){

float tong=0.0;

for(int i=0 ;i< n;i++){

tong+=(float)(ps[i].tu)/ps[i].mau;

}

return (float)tong/n;

}

int main(){

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-8\\fraction.txt", "r", stdin) ;

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-8\\fraction.out", "w", stdout);

int n; cin >> n;

Ps\* ps= new Ps[n];

nhap (ps, n);

caua(ps, n);

caub (ps, n);

cout << cauc (ps, n) << endl;

cout << "cau d" << endl;

phansomax (ps, n);

phanson1max (ps, n);

phansol1min (ps, n);

float e= trbcong (ps, n);

demphansotoigian (ps, n);

cout << e;

return 0;

}

//Bai 9

#include <bits/stdc++.h>

using namespace std;

//tinh do dai cua chuoi

int strlen (char s[]){

int i= 0;

while (1){

if (s[i]== '\0'){ //gap ki tu ket thuc chuoi

return i;

}

i++;

}

}

//tim tu ben phai

string findright(char s[]) {

string kq = "";

for (int i = strlen(s) - 1; i >= 0; i--) {

if (s[i] != ' ') {

kq = s[i] + kq; //gep s[i] cho kq va gan cho kq

} else {

break;

}

}

return kq;

}

//dem do dai cua 1 cuoi

int count(char str[]) {

if (strlen(str)== 0){

return 0;

}

int cnt = 1;

for (int i = 0; i < strlen(str); i++) {

if (str[i] == ' ') {

cnt++;

}

}

return cnt;

}

int main() {

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-9\\str.inp", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-9\\str.out", "w", stdout);

int n; cin >> n; cin.ignore();

char s[256];

int sum= 0;

cout << "CAU a:" << endl;

for (int i= 0; i< n; ++i){

cin.getline (s, 256);

//cau a

cout << findright(s) << endl;

sum+= count(s); // tong do cua tat ca cac chuoi

}

//cau b

cout << "CAU b:" << endl;

cout << sum;

return 0;

}

//Bai 10

#include <iostream>

#include <string>

using namespace std;

//ki tu la chu cai

bool isalpha (char s){

return (s >= 'a' && s <= 'z') || (s >= 'A' && s <= 'Z');

}

// Câu a

// tim tu dai nhat

string tudainhat(string &str) {

string tudainhat = "";

string tudangxet = "";

for (char ch : str) {

if (isalpha(ch)) { //kiem tra ki tu do la chu cai khong

tudangxet += ch; //ghep tudangxet voi ch

} else {

if (tudangxet.length() > tudainhat.length()) {

tudainhat = tudangxet;

}

tudangxet = "";

}

}

//so sanh do dai chuoi

if (tudangxet.length() > tudainhat.length()) {

tudainhat = tudangxet;

}

return tudainhat;

}

// Câu b

//tim tu ben phai

string tubenphai(string s) {

string kq = "";

for (int i = s.length(); i >= 0; i--) {

if (s[i] != ' ') {

kq = s[i] + kq;

} else { // sau khi gap ki tu khoang trang thi dung

break;

}

}

return kq;

}

//tim tu ben trai

string tubentrai(string s) {

string kq = "";

for (int i = 0; i < s.length(); i++) {

if (s[i] != ' ' || i == s.length() - 1) {

kq += s[i];

} else { // sau khi gap ki tu khoang trang thi dung

break;

}

}

return kq;

}

// Câu c

// Chuoi dai nhat

void chuoidainhat(string s, string& dainhat) {

if (s.length() > dainhat.length()) {

dainhat = s;

} else if (s.length() == dainhat.length()) { //chuoi bang chuoi dai nhat thi in ra luon chuoi do

cout << dainhat << endl;

cout << s << endl;

}

}

// Câu d

// dem so luong phan tu cua moi chuoi

int demtu (string s) {

int count = 1;

for (int i = 0; i < s.length(); i++) {

if (s[i] == ' ') {

count++;

}

}

return count;

}

// Câu e

// dem so luong tu your

int demtucandem(string s, string tucandem) {

int count = 0;

if (tucandem.length() == 0) { //neu chuoi rong

return 0;

}

for (int i = 0; i < s.length(); i++) {

if (s[i] == tucandem[0]) { //ki tu thu i giong voi tu "y"

bool datimthay = true;

for (int j = 0; j < tucandem.length(); j++) { //so sanh ki tu sau i voi uor

if (s[i + j] != tucandem[j]) {

datimthay = false; // ki tu sau i khac our

break;

}

}

if (datimthay) { // tu giong tu your

count++;

}

}

}

return count;

}

int main() {

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-10\\STR.INP", "r", stdin);

freopen("D:\\C++\\Chapter-4-exercise programing techniques\\exer-10\\STR.OUT", "w", stdout);

int n;

cin >> n;

cin.ignore();

string s[1000];

int size= 0; // kich thuoc cua chuoi

//nhap chuoi va tang kich thuoc tung chuoi

for (int i= 0; i< n && size < 1000; i++){

getline (cin, s[size++]);

}

//cau a. tu dai nhat

cout << "CAU a:" << endl;

for (int i = 0; i < size;i++){

cout << tudainhat(s[i]) << endl;

}

//cau b. tu ben trai va tu ben phai

cout << "CAU b:" << endl;

for (int i= 0; i< size; i++){

cout << tubentrai(s[i]) << " " << tubenphai(s[i]) << endl;

}

//cau c. chuoi dai nhat

cout << "CAU c" << endl;

string dainhat; // chuoi dai nhat

dainhat = "";

for (int i= 0; i< size; i++){

chuoidainhat(s[i], dainhat);

}

cout << dainhat << endl;

//cau d. so luong tu trong n chuoi

cout << "CAU d:" << endl;

int soluongchu= 0;

int soluongtuyour= 0;

for (int i= 0; i< n; i++){

soluongchu+= demtu(s[i]);

soluongtuyour+= demtucandem(s[i], "your");

}

cout << soluongchu <<endl;

//cau e. so luong tu "your"

cout << "CAU e:" << endl;

cout << soluongtuyour<< endl;

return 0;

}