#include <iostream>

using namespace std;

int main() {

float Pc, Tc, P, T, a, b, V1, Vo, R = 8.314, Fvo, F1Vo;

cout << "Enter critical pressure and temperature: ";

cin >> Pc >> Tc;

cout << "Enter actual pressure and temperature: ";

cin >> P >> T;

Vo = (R \* T) / P;

cout << "Ideal molar volume: " << Vo << endl;

a = (27 \* R \* R \* Tc \* Tc) / (64 \* Pc);

b = (R \* Tc) / (8 \* Pc);

cout << "Values of 'a' and 'b': " << a << " and " << b << endl;

do {

Fvo = ((P + (a / (Vo \* Vo))) \* (Vo - b)) - (R \* T);

F1Vo = ((Vo - b) \* ((-2 \* a) / (Vo \* Vo \* Vo))) + ((P + (a / (Vo \* Vo))) \* (1 - b));

V1 = Vo - (Fvo / F1Vo);

if ((V1 - Vo) < 0.001) {

cout << "Molar volume: " << V1 << endl;

} else {

Vo = V1;

}

} while ((V1 - Vo) >= 0.001);

return 0;

}