

```

program fibonacci
implicit none
real(8) :: x0,x1,x2,rn,pi
integer :: i

!pi can be obtained by the ArcCos of -1
! the .d0 is just a way to emphasize that -1 is a double precision number
! and not an integer

pi=acos(-1.d0)

! reading the initial condition x1 from the keyboard

write(*,*) 'please enter initial condition'
read(*,*) x1

! x0 is set to 1

x0=1

!for the problem 2, add the line below to the code, the initial condition
!x1 will then be replaced with (1-sqrt(5))/2, instead of what you entered
!to the keyboard

!   x1=(1-sqrt(5.d0))/2.d0

write(*,*) 'Fibonacci sequence : ',0,x0
write(*,*) 'Fibonacci sequence : ',1,x1

do i=1,50

! Fibonacci sequence

  x2 = x1 + x0
!here we compute rn, which is obtained by the ratio x_n / x_{n-1}
!in our case x_n is x2, and x_{n-1} is x1
rn=x2/x1

! to obtain x3=x2+x1 at the next step of the sequence, what we do
! is the following : we copy the value of x1 into x0, and copy the value
! of x2 to x1. As a matter of fact, now x2 is x3.

x0=x1
x1=x2

! if you swap the two lines above, you will get x0=x1=x2, which is wrong
! remember that the line of codes are executed in sequential order, from
! top to bottom

write(*,*) 'Fibonacci sequence : ', i, x2

!writing into the file fort.100 the values of rn obtained at different
iterations

write(100,*) i, rn

!writing the deviation from exact result into the file fort.101

write(101,*) i, rn - (1.0 + sqrt(5.d0) ) / 2.0

```

```
end do
write(*,*) 'initial conditions : ', x0,x1
write(*,*) 'convergence point rn : ', rn

end program
```