North South University

HW3

https://ece.northsouth.edu/~shahriar.karim/CSE_425/CSE_425_HOMEWORK_4.pdf

Submitted by:

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ID: 2112343642

Course: CSE425

Section: 1

Submitted to:

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Department of Electrical and Computer Engineering (ECE)

North South University

Date of submission: 25/04/2025

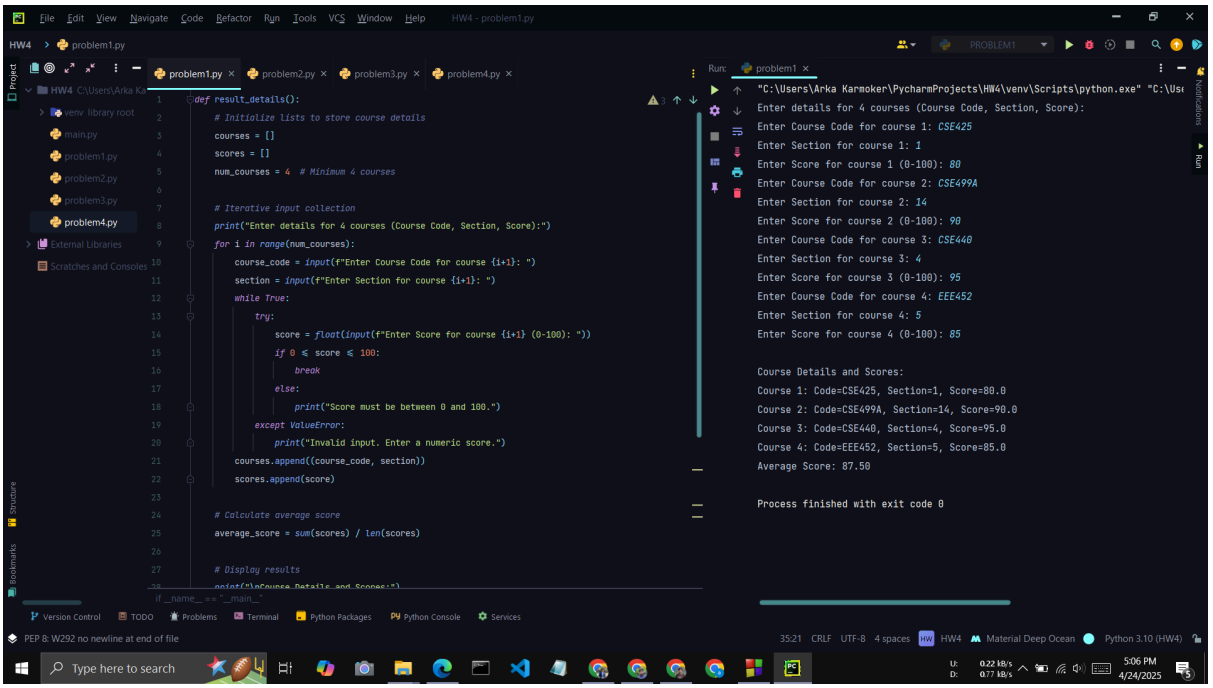
Answer to the question no: 1

problem1_python.py

```
def result_details():
    # Initialize lists to store course details
    courses = []
    scores = []
    num_courses = 4  # Minimum 4 courses

    # Iterative input collection
    print("Enter details for 4 courses (Course Code, Section, Score):")
    for i in range(num_courses):
        course_code = input(f"Enter Course Code for course {i+1}: ")
        section = input(f"Enter Section for course {i+1}: ")
        while True:
            try:
                score = float(input(f"Enter Score for course {i+1} (0-100): "))
                if 0 <= score <= 100:
                    break
                else:
                    print("Score must be between 0 and 100.")
            except ValueError:
                print("Invalid input. Enter a numeric score.")
        courses.append((course_code, section))
        scores.append(score)

    # Calculate average score
    average_score = sum(scores) / len(scores)

    # Display results
    print("\nCourse Details and Scores:")
    for i, (course, score) in enumerate(zip(courses, scores)):
        print(f"Course {i+1}: Code={course[0]}, Section={course[1]}, Score={score}")
    print(f"Average Score: {average_score:.2f}")

# Run the function
if __name__ == "__main__":
    result_details()
```

Output:

```
Enter details for 4 courses (Course Code, Section, Score):
Enter Course Code for course 1: CSE425
Enter Section for course 1: 1
Enter Score for course 1 (0-100): 80
Enter Course Code for course 2: CSE499A
Enter Section for course 2: 14
Enter Score for course 2 (0-100): 90
Enter Course Code for course 3: CSE440
Enter Section for course 3: 4
Enter Score for course 3 (0-100): 95
Enter Course Code for course 4: EEE452
Enter Section for course 4: 5
Enter Score for course 4 (0-100): 85

Course Details and Scores:
Course 1: Code=CSE425, Section=1, Score=80.0
Course 2: Code=CSE499A, Section=14, Score=90.0
Course 3: Code=CSE440, Section=4, Score=95.0
Course 4: Code=EEE452, Section=5, Score=85.0
Average Score: 87.50

Process finished with exit code 0
```

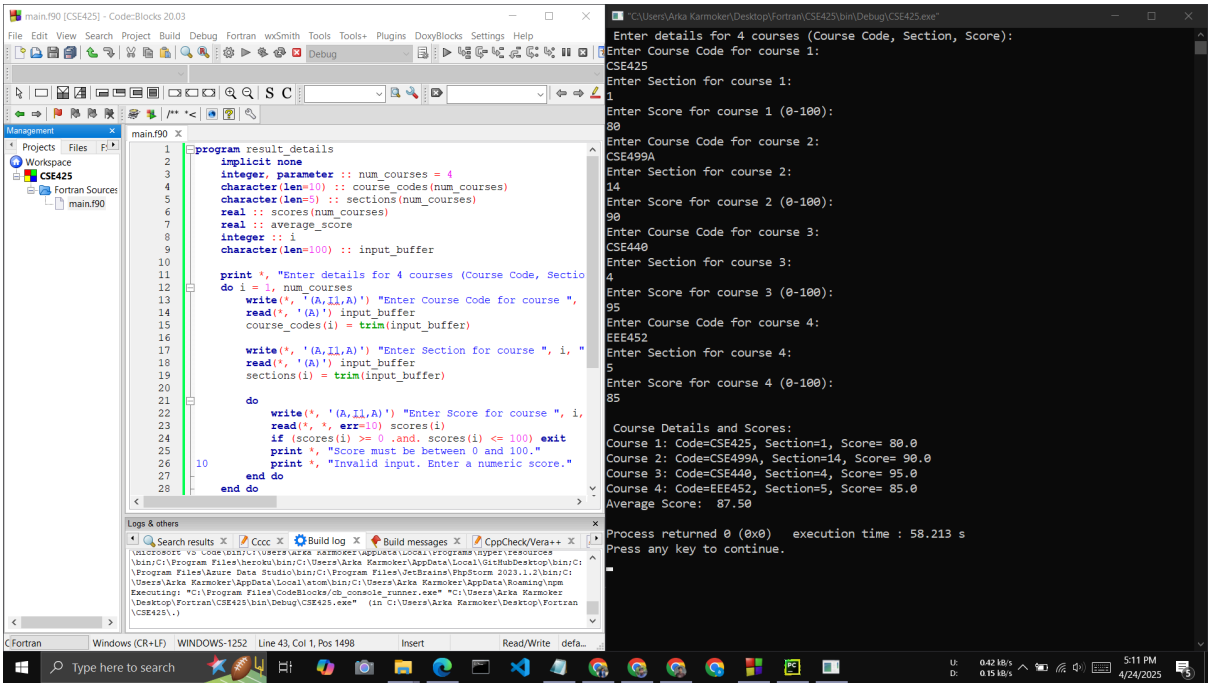


problem1_fortran.f90

```
program result_details
    implicit none
    integer, parameter :: num_courses = 4
    character(len=10) :: course_codes(num_courses)
    character(len=5) :: sections(num_courses)
    real :: scores(num_courses)
    real :: average_score
    integer :: i
    character(len=100) :: input_buffer

    print *, "Enter details for 4 courses (Course Code, Section, Score):"
    do i = 1, num_courses
        write(*, '(A,I1,A)') "Enter Course Code for course ", i, ": "
        read(*, '(A)') input_buffer
        course_codes(i) = trim(input_buffer)

        write(*, '(A,I1,A)') "Enter Section for course ", i, ": "
        read(*, '(A)') input_buffer
        sections(i) = trim(input_buffer)

        do
            write(*, '(A,I1,A)') "Enter Score for course ", i, " (0-100): "
            read(*, *, err=10) scores(i)
            if (scores(i) >= 0 .and. scores(i) <= 100) exit
            print *, "Score must be between 0 and 100."
10          print *, "Invalid input. Enter a numeric score."
        end do
    end do

    ! Calculate average score
    average_score = sum(scores) / num_courses

    ! Display results
    print *, ""
    print *, "Course Details and Scores:"
    do i = 1, num_courses
        print '(A,I1,A,A,A,A,A,F5.1)', "Course ", i, ": Code=", trim(course_codes(i)), &
            ", Section=", trim(sections(i)), ", Score=", scores(i)
    end do
    print '(A,F6.2)', "Average Score: ", average_score

end program result_details
```

Output:

```
Enter details for 4 courses (Course Code, Section, Score):
Enter Course Code for course 1:
CSE425
Enter Section for course 1:
1
Enter Score for course 1 (0-100):
80
Enter Course Code for course 2:
CSE499A
Enter Section for course 2:
14
Enter Score for course 2 (0-100):
90
Enter Course Code for course 3:
CSE440
Enter Section for course 3:
4
Enter Score for course 3 (0-100):
95
Enter Course Code for course 4:
EEE452
Enter Section for course 4:
5
Enter Score for course 4 (0-100):
85

 Course Details and Scores:
Course 1: Code=CSE425, Section=1, Score= 80.0
Course 2: Code=CSE499A, Section=14, Score= 90.0
Course 3: Code=CSE440, Section=4, Score= 95.0
Course 4: Code=EEE452, Section=5, Score= 85.0
Average Score:  87.50

Process returned 0 (0x0)   execution time : 48.432 s
Press any key to continue.
```


main.f90 [CSE425] - Code::Blocks 20.03
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Management
Projects Files
Workspace
CSE425
Fortran Sources
main.f90
main.f90
1 program result_details
2 implicit none
3 integer, parameter :: num_courses = 4
4 character(len=10) :: course_codes(num_courses)
5 character(len=5) :: sections(num_courses)
6 real :: scores(num_courses)
7 real :: average_score
8 integer :: i
9 character(len=100) :: input_buffer
10
11 print *, "Enter details for 4 courses (Course Code, Sectio
12 do i = 1, num_courses
13 write(*, '(A,I1,A)') "Enter Course Code for course ",
14 read(*, '(A)') input_buffer
15 course_codes(i) = trim(input_buffer)
16
17 write(*, '(A,I1,A)') "Enter Section for course ", i, "
18 read(*, '(A)') input_buffer
19 sections(i) = trim(input_buffer)
20
21 do
22 write(*, '(A,I1,A)') "Enter Score for course ", i,
23 read(*, *, err=10) scores(i)
24 if (scores(i) >= 0 .and. scores(i) <= 100) exit
25 print *, "Score must be between 0 and 100."
26 10 print *, "Invalid input. Enter a numeric score."
27 end do
28 end do
Logs & others
Search results
Cccc
Build log
Build messages
CppCheck/Vera++
Fortran
Windows (CR+LF)
WINDOWS-1252
Line 43, Col 1, Pos 1498
Insert
Read/Write
"C:\Users\Arka Karmoker\Desktop\Fortran\CSE425\bin\Debug\CSE425.exe"
Enter details for 4 courses (Course Code, Section, Score):
Enter Course Code for course 1:
CSE425
Enter Section for course 1:
1
Enter Score for course 1 (0-100):
80
Enter Course Code for course 2:
CSE499A
Enter Section for course 2:
14
Enter Score for course 2 (0-100):
90
Enter Course Code for course 3:
CSE440
Enter Section for course 3:
4
Enter Score for course 3 (0-100):
95
Enter Course Code for course 4:
EEE452
Enter Section for course 4:
5
Enter Score for course 4 (0-100):
85
Course Details and Scores:
Course 1: Code=CSE425, Section=1, Score= 80.0
Course 2: Code=CSE499A, Section=14, Score= 90.0
Course 3: Code=CSE440, Section=4, Score= 95.0
Course 4: Code=EEE452, Section=5, Score= 85.0
Average Score: 87.50
Process returned 0 (0x0) execution time : 58.213 s
Press any key to continue.
Type here to search
5:11 PM
4/24/2025

Answer to the question no: 2

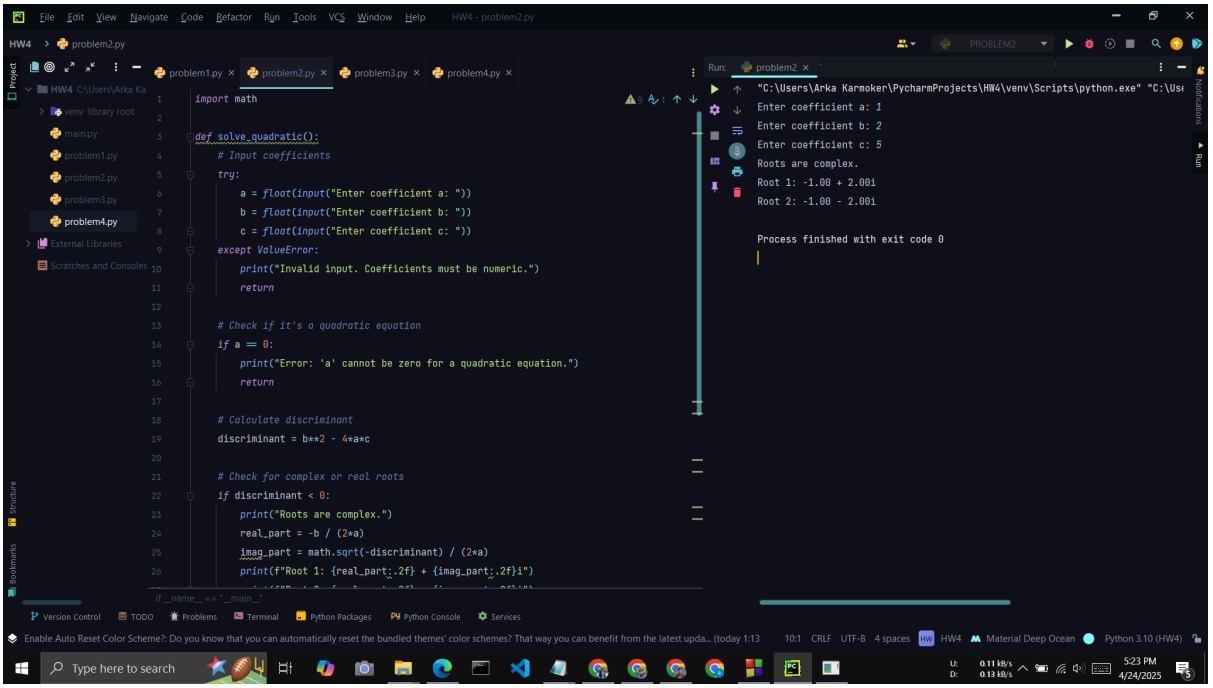
problem2_python.py

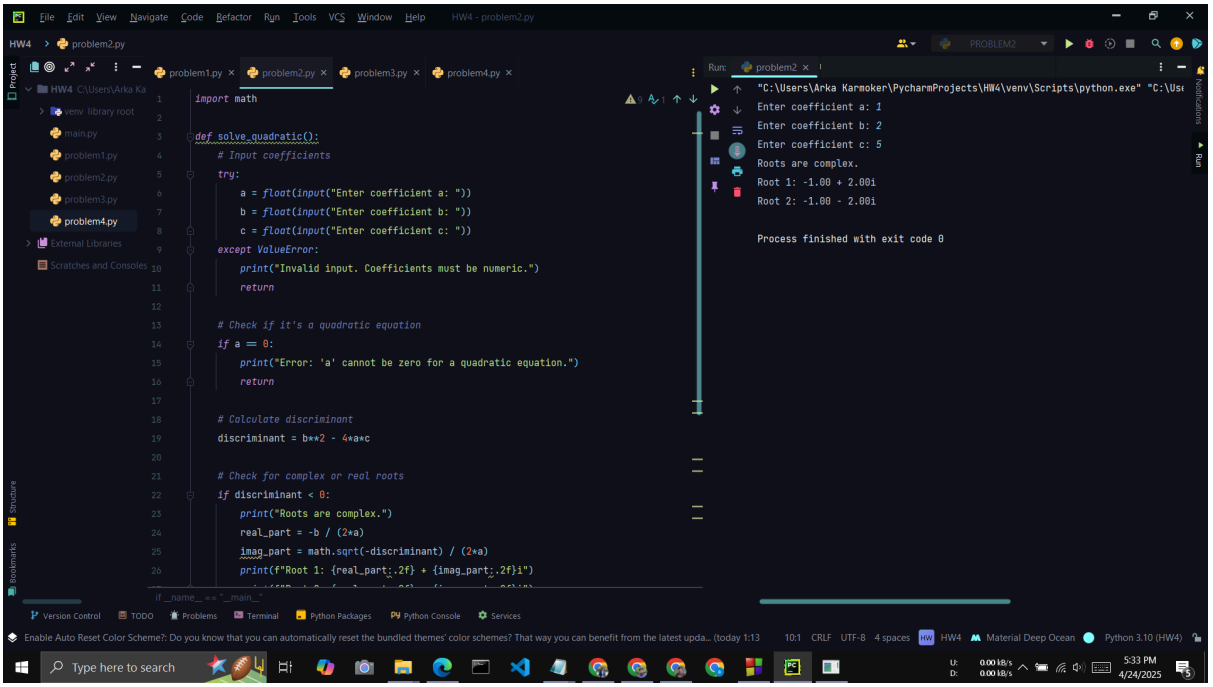
```
import math

def solve_quadratic():
    # Input coefficients
    try:
        a = float(input("Enter coefficient a: "))
        b = float(input("Enter coefficient b: "))
        c = float(input("Enter coefficient c: "))
    except ValueError:
        print("Invalid input. Coefficients must be numeric.")
        return

    # Check if it's a quadratic equation
    if a == 0:
        print("Error: 'a' cannot be zero for a quadratic equation.")
        return

    # Calculate discriminant
    discriminant = b**2 - 4*a*c

    # Check for complex or real roots
    if discriminant < 0:
        print("Roots are complex.")
        real_part = -b / (2*a)
        imag_part = math.sqrt(-discriminant) / (2*a)
        print(f"Root 1: {real_part:.2f} + {imag_part:.2f}i")
        print(f"Root 2: {real_part:.2f} - {imag_part:.2f}i")
    else:
        root1 = (-b + math.sqrt(discriminant)) / (2*a)
        root2 = (-b - math.sqrt(discriminant)) / (2*a)
        print(f"Root 1: {root1:.2f}")
        print(f"Root 2: {root2:.2f}")

# Run the function
if __name__ == "__main__":
    solve_quadratic()
```

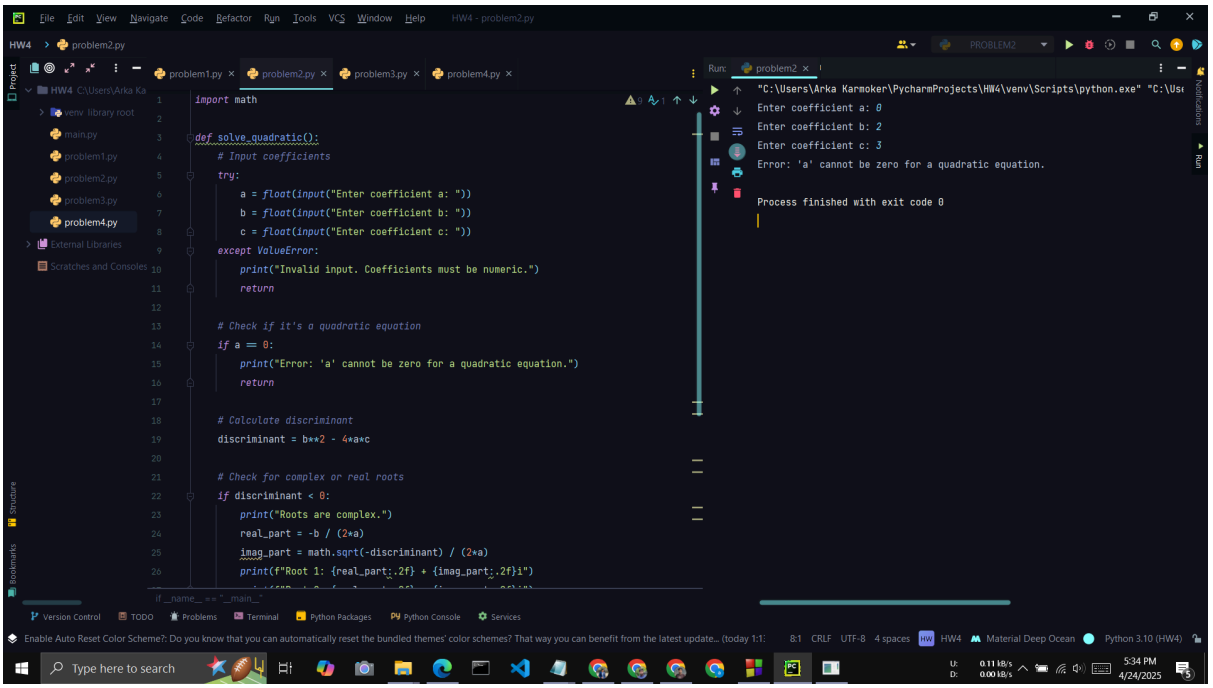
Output 1(Real roots):
Enter coefficient a: 1
Enter coefficient b: -3
Enter coefficient c: 2
Root 1: 2.00
Root 2: 1.00

Output 2(Complex roots):
Enter coefficient a: 1
Enter coefficient b: 2
Enter coefficient c: 5
Roots are complex.
Root 1: -1.00 + 2.00i
Root 2: -1.00 - 2.00i

Output 3(Invalid input):
Enter coefficient a: 0
Enter coefficient b: 2
Enter coefficient c: 3
Error: 'a' cannot be zero for a quadratic equation.




import math
def solve_quadratic():
# Input coefficients
try:
a = float(input("Enter coefficient a: "))
b = float(input("Enter coefficient b: "))
c = float(input("Enter coefficient c: "))
except ValueError:
print("Invalid input. Coefficients must be numeric.")
return
# Check if it's a quadratic equation
if a == 0:
print("Error: 'a' cannot be zero for a quadratic equation.")
return
# Calculate discriminant
discriminant = b**2 - 4*a*c
# Check for complex or real roots
if discriminant < 0:
print("Roots are complex.")
real_part = -b / (2*a)
imag_part = math.sqrt(-discriminant) / (2*a)
print(f"Root 1: {real_part:.2f} + {imag_part:.2f}i")
"C:\Users\Arka Karmoker\PycharmProjects\HW4\venv\Scripts\python.exe" "C:\Use
Enter coefficient a: 1
Enter coefficient b: 2
Enter coefficient c: 5
Roots are complex.
Root 1: -1.00 + 2.00i
Root 2: -1.00 - 2.00i
Process finished with exit code 0


import math
def solve_quadratic():
# Input coefficients
try:
a = float(input("Enter coefficient a: "))
b = float(input("Enter coefficient b: "))
c = float(input("Enter coefficient c: "))
except ValueError:
print("Invalid input. Coefficients must be numeric.")
return
# Check if it's a quadratic equation
if a == 0:
print("Error: 'a' cannot be zero for a quadratic equation.")
return
# Calculate discriminant
discriminant = b**2 - 4*a*c
# Check for complex or real roots
if discriminant < 0:
print("Roots are complex.")
real_part = -b / (2*a)
imag_part = math.sqrt(-discriminant) / (2*a)
print(f"Root 1: {real_part:.2f} + {imag_part:.2f}i")
"C:\Users\Arka Karmoker\PycharmProjects\HW4\venv\Scripts\python.exe" "C:\Use
Enter coefficient a: 0
Enter coefficient b: 2
Enter coefficient c: 3
Error: 'a' cannot be zero for a quadratic equation.
Process finished with exit code 0

problem2_fortran.f90

```
program solve_quadratic
    implicit none
    real :: a, b, c, discriminant, root1, root2, real_part, imag_part

    ! Input coefficients
    print *, "Enter coefficient a: "
    read(*, *, err=10) a
    print *, "Enter coefficient b: "
    read(*, *, err=10) b
    print *, "Enter coefficient c: "
    read(*, *, err=10) c

    ! Check if it's a quadratic equation
    if (a == 0) then
        print *, "Error: 'a' cannot be zero for a quadratic equation."
        stop
    end if

    ! Calculate discriminant
    discriminant = b**2 - 4*a*c

    ! Check for complex or real roots
    if (discriminant < 0) then
        print *, "Roots are complex."
        real_part = -b / (2*a)
        imag_part = sqrt(-discriminant) / (2*a)
        print '(A,F6.2,A,F6.2,A)', "Root 1: ", real_part, " + ", imag_part, "i"
        print '(A,F6.2,A,F6.2,A)', "Root 2: ", real_part, " - ", imag_part, "i"
    else
        root1 = (-b + sqrt(discriminant)) / (2*a)
        root2 = (-b - sqrt(discriminant)) / (2*a)
        print '(A,F6.2)', "Root 1: ", root1
        print '(A,F6.2)', "Root 2: ", root2
    end if
    stop

10  print *, "Invalid input. Coefficients must be numeric."
end program solve_quadratic
```

Output 1(Real roots):

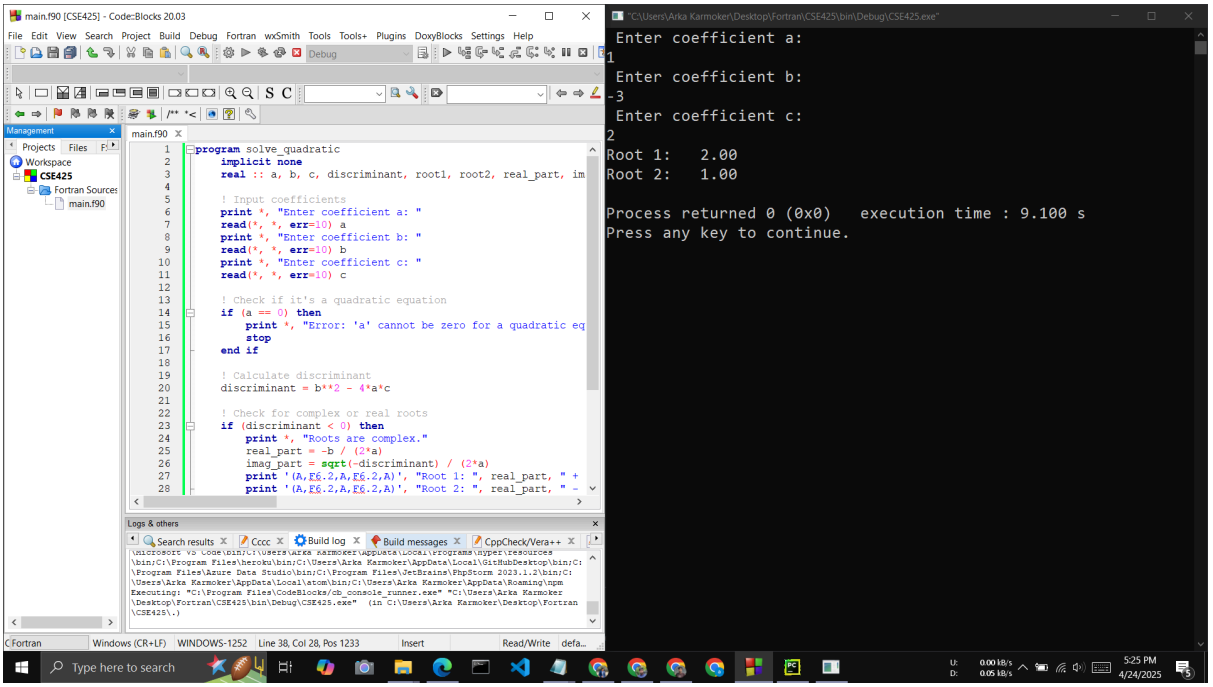
```
 Enter coefficient a:
1
 Enter coefficient b:
-3
 Enter coefficient c:
2
Root 1:   2.00
Root 2:   1.00

Process returned 0 (0x0)   execution time : 9.100 s
Press any key to continue.
```

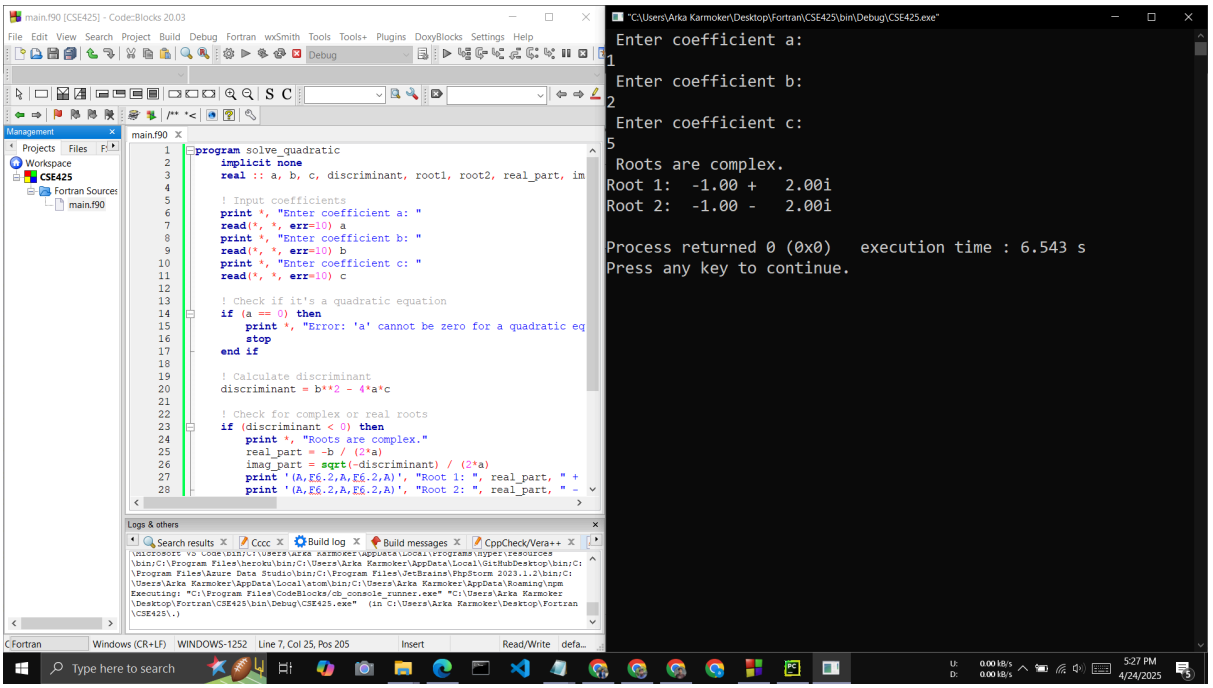
Output 2(Complex roots):

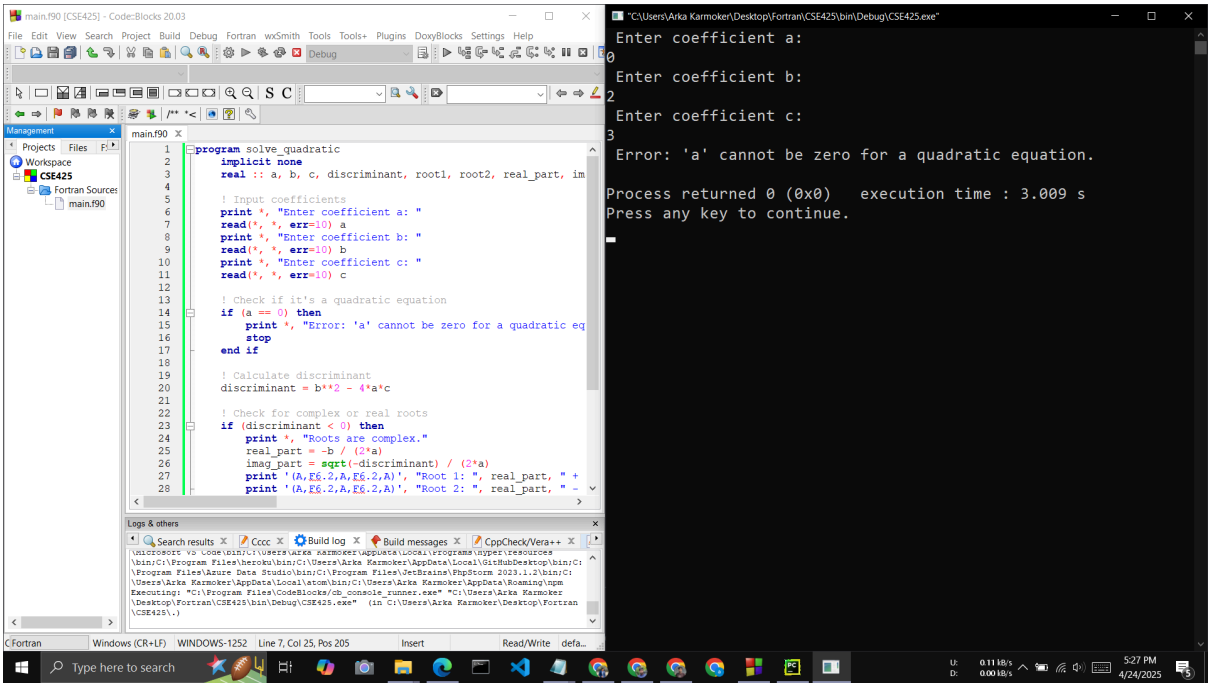
```
 Enter coefficient a:
1
 Enter coefficient b:
2
 Enter coefficient c:
5
 Roots are complex.
Root 1:  -1.00 +   2.00i
Root 2:  -1.00 -   2.00i

Process returned 0 (0x0)   execution time : 6.543 s
Press any key to continue.
```

Output 3(Invalid input):

```
 Enter coefficient a:
0
 Enter coefficient b:
2
 Enter coefficient c:
3
 Error: 'a' cannot be zero for a quadratic equation.

Process returned 0 (0x0)   execution time : 3.009 s
Press any key to continue.
```


main.f90 [CSE425] - Code::Blocks 20.03
"C:\Users\Arka Karmoker\Desktop\Fortran\CSE425\bin\Debug\CSE425.exe"
Enter coefficient a:
1
Enter coefficient b:
-3
Enter coefficient c:
2
Root 1: 2.00
Root 2: 1.00
Process returned 0 (0x0) execution time : 9.100 s
Press any key to continue.


main.f90 [CSE425] - Code::Blocks 20.03
"C:\Users\Arka Karmoker\Desktop\Fortran\CSE425\bin\Debug\CSE425.exe"
Enter coefficient a:
1
Enter coefficient b:
2
Enter coefficient c:
5
Roots are complex.
Root 1: -1.00 + 2.00i
Root 2: -1.00 - 2.00i
Process returned 0 (0x0) execution time : 6.543 s
Press any key to continue.


main.f90 [CSE425] - Code::Blocks 20.03
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Management
Projects Files
Workspace
CSE425
Fortran Sources
main.f90
main.f90
1 program solve_quadratic
2 implicit none
3 real :: a, b, c, discriminant, root1, root2, real_part, im
4
5 ! Input coefficients
6 print *, "Enter coefficient a: "
7 read(*, *, err=10) a
8 print *, "Enter coefficient b: "
9 read(*, *, err=10) b
10 print *, "Enter coefficient c: "
11 read(*, *, err=10) c
12
13 ! Check if it's a quadratic equation
14 if (a == 0) then
15 print *, "Error: 'a' cannot be zero for a quadratic eq
16 stop
17 end if
18
19 ! Calculate discriminant
20 discriminant = b**2 - 4*a*c
21
22 ! Check for complex or real roots
23 if (discriminant < 0) then
24 print *, "Roots are complex."
25 real_part = -b / (2*a)
26 imag_part = sqrt(-discriminant) / (2*a)
27 print '(A,F6.2,A,F6.2,A)', "Root 1: ", real_part, " +
28 print '(A,F6.2,A,F6.2,A)', "Root 2: ", real_part, " -
Logs & others
Search results
Cccc
Build log
Build messages
CppCheck/Vera++
Executing: "C:\Program Files\CodeBlocks/cb_console_runner.exe" "C:\Users\Arka Karmoker
\Desktop\Fortran\CSE425\bin\Debug\CSE425.exe" (in C:\Users\Arka Karmoker\Desktop\Fortran
\CSE425\.)
Fortran
Windows (CR+LF)
WINDOWS-1252
Line 7, Col 25, Pos 205
Insert
Read/Write
"C:\Users\Arka Karmoker\Desktop\Fortran\CSE425\bin\Debug\CSE425.exe"
Enter coefficient a:
0
Enter coefficient b:
2
Enter coefficient c:
3
Error: 'a' cannot be zero for a quadratic equation.
Process returned 0 (0x0) execution time : 3.009 s
Press any key to continue.
Type here to search
5:27 PM
4/24/2025

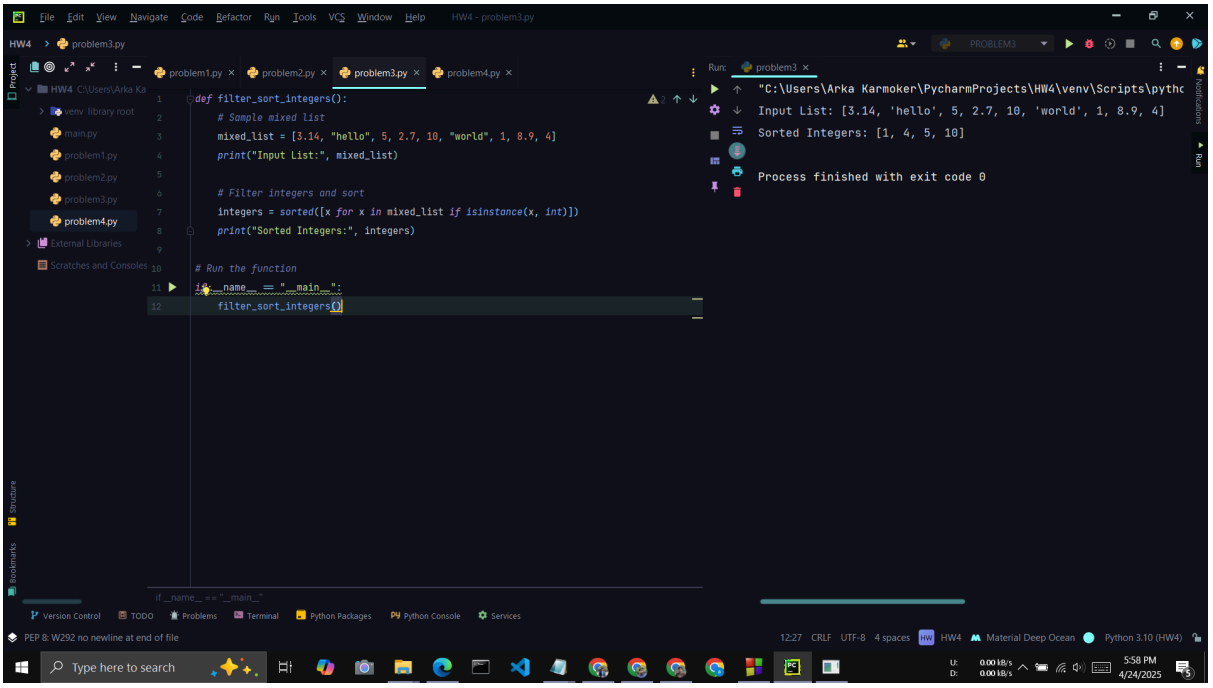
Answer to the question no: 3

problem3_python.py

```
def filter_sort_integers():
    # Sample mixed list
    mixed_list = [3.14, "hello", 5, 2.7, 10, "world", 1, 8.9, 4]
    print("Input List:", mixed_list)

    # Filter integers and sort
    integers = sorted([x for x in mixed_list if isinstance(x, int)])
    print("Sorted Integers:", integers)

# Run the function
if __name__ == "__main__":
    filter_sort_integers()
```

Output:

```
Input List: [3.14, 'hello', 5, 2.7, 10, 'world', 1, 8.9, 4]
Sorted Integers: [1, 4, 5, 10]
```



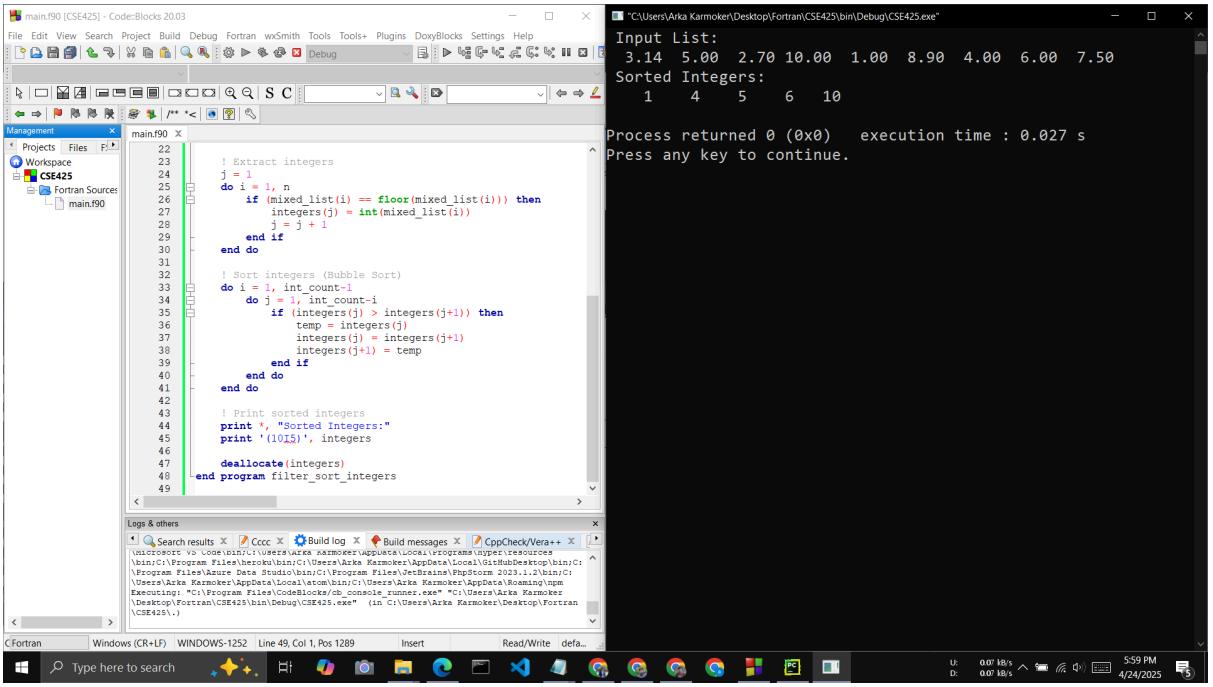
problem3_fortran.f90

```
program filter_sort_integers
    implicit none
    integer, parameter :: n = 9
    integer :: i, j, temp, int_count
    real :: mixed_list(n) = [3.14, 5.0, 2.7, 10.0, 1.0, 8.9, 4.0, 6.0, 7.5]
    integer, allocatable :: integers(:)

    ! Print input list
    print *, "Input List:"
    print '(9F6.2)', mixed_list

    ! Count integers (numbers with no decimal part)
    int_count = 0
    do i = 1, n
        if (mixed_list(i) == floor(mixed_list(i))) then
            int_count = int_count + 1
        end if
    end do

    ! Allocate array for integers
    allocate(integers(int_count))

    ! Extract integers
    j = 1
    do i = 1, n
        if (mixed_list(i) == floor(mixed_list(i))) then
            integers(j) = int(mixed_list(i))
            j = j + 1
        end if
    end do

    ! Sort integers (Bubble Sort)
    do i = 1, int_count-1
        do j = 1, int_count-i
            if (integers(j) > integers(j+1)) then
                temp = integers(j)
                integers(j) = integers(j+1)
                integers(j+1) = temp
            end if
        end do
    end do

    ! Print sorted integers
    print *, "Sorted Integers:"
    print '(10I5)', integers
```

```
    deallocate(integers)
end program filter_sort_integers
```

Output:

```
 Input List:
  3.14  5.00  2.70 10.00  1.00  8.90  4.00  6.00  7.50
 Sorted Integers:
    1    4    5    6   10

Process returned 0 (0x0)   execution time : 0.027 s
Press any key to continue.
```



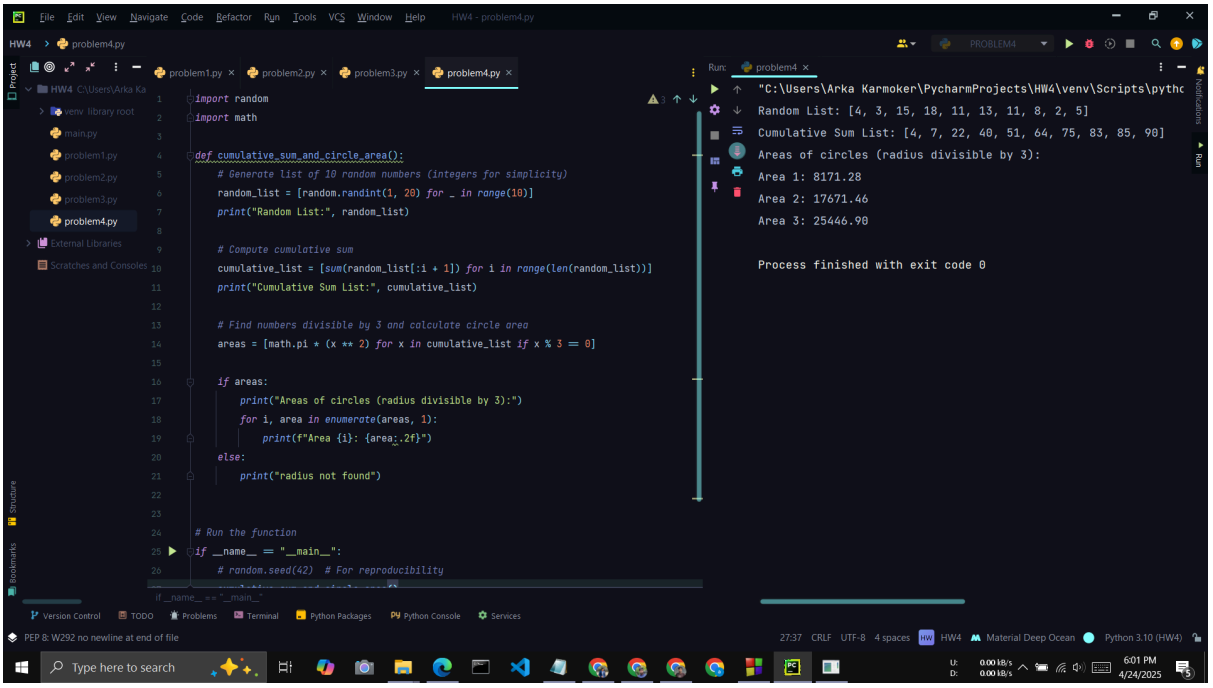
Answer to the question no: 4

problem4_python.py

```
import random
import math


def cumulative_sum_and_circle_area():
    # Generate list of 10 random numbers (integers for simplicity)
    random_list = [random.randint(1, 20) for _ in range(10)]
    print("Random List:", random_list)

    # Compute cumulative sum
    cumulative_list = [sum(random_list[:i + 1]) for i in range(len(random_list))]
    print("Cumulative Sum List:", cumulative_list)

    # Find numbers divisible by 3 and calculate circle area
    areas = [math.pi * (x ** 2) for x in cumulative_list if x % 3 == 0]

    if areas:
        print("Areas of circles (radius divisible by 3):")
        for i, area in enumerate(areas, 1):
            print(f"Area {i}: {area:.2f}")
    else:
        print("radius not found")


# Run the function
if __name__ == "__main__":
    # random.seed(42)  # For reproducibility
    cumulative_sum_and_circle_area()
```

Output:

Random List: [4, 3, 15, 18, 11, 13, 11, 8, 2, 5]
Cumulative Sum List: [4, 7, 22, 40, 51, 64, 75, 83, 85, 90]
Areas of circles (radius divisible by 3):
Area 1: 8171.28
Area 2: 17671.46
Area 3: 25446.90



problem4_fortran.f90

```
program cumulative_sum_and_circle_area
    implicit none
    integer, parameter :: n = 10
    real :: random_list(n), cumulative_list(n)
    real :: pi = 3.14159265359
    integer :: i, count
    logical :: found

    ! Seed for reproducibility
    call random_seed()

    ! Generate random numbers (1 to 20)
    do i = 1, n
        call random_number(random_list(i))
        random_list(i) = 1 + floor(20 * random_list(i))
    end do

    ! Print random list
    print *, "Random List:"
    print '(10I5)', int(random_list)

    ! Compute cumulative sum
    cumulative_list(1) = random_list(1)
    do i = 2, n
        cumulative_list(i) = cumulative_list(i-1) + random_list(i)
    end do

    ! Print cumulative sum list
    print *, "Cumulative Sum List:"
    print '(10I5)', int(cumulative_list)

    ! Calculate circle areas for numbers divisible by 3
    found = .false.
    print *, "Areas of circles (radius divisible by 3):"
    count = 0
    do i = 1, n
        if (mod(int(cumulative_list(i)), 3) == 0) then
            found = .true.
            count = count + 1
            print '(A,I2,A,F10.2)', "Area ", count, ": ", pi * (cumulative_list(i) ** 2)
        end if
    end do

    if (.not. found) then
        print *, "radius not found"
    end if
```

```
end program cumulative_sum_and_circle_area
```

Output:

```
 Random List:
   4   16   11    4   16    9   12    1    6   15
 Cumulative Sum List:
   4   20   31   35   51   60   72   73   79   94
 Areas of circles (radius divisible by 3):
Area  1:    8171.28
Area  2:   11309.73
Area  3:   16286.02

Process returned 0 (0x0)   execution time : 0.021 s
Press any key to continue.
```