

CS 0411 MIDTERM EXAMINATION

March 3, 2010

Duration: one and half hours

Student Name: Answer

Student Number:

Note. There are total 8 problems in this exam set (7 pages). This exam allows a student to bring one information sheet prepared by herself/himself.

Problem 1. 5 marks

The following is displayed in a computer screen, which is using a UNIX operation system. Two lines are missing. Fill these lines correctly according to the UNIX command `ls` and the information provided on the screen.

```
$ ls
fortran mail public_html file.f90
$ mkdir cs0411
$ mv file.f90 ./cs0411
$ cd cs0411
$ f90 file.f90 -o try.out
$ ls
file.f90 try.out
$ cp file.f90 ../file1.f90
$ cd ..
$ ls
cs0411 fortran mail public_html file1.f90
```

Problem 2. 5 marks

Indicate which of the followings are valid Fortran constants:

(a) 9,999 (b) 123456789 (c) +234 (d) -23. (e) 3.00E3 (f) -+90

The valid Fortran constants are: (b) (c) (d) (e)

Problem 3. 8 marks

Indicate which of the followings are valid Fortran assignment statements:

- (1) `Gama = 6.278`
- (2) `N = N * N + N`
- (3) `A + B = C`
- (4) `ch = 23.4 + "3.14"`
- (5) `B = 45.0E-6`
- (6) `A1 = "plus"(3:)//"5.8"`
- (7) `- C = 6.283`
- (8) `ID = REAL(123)/0.89**2`

The valid Fortran statements are: (1) (2) (5) (6) (8)

Problem 4. 12 marks

Find and write down the value of each of the expressions:

- (1) $10/4 + 2*2/3$
- (2) $3.0+4.0/2.0**2$
- (3) $64.0**1/2$
- (4) `Name(3:9) !where Name="cs0411"//"midterm"`

The values are:

- (1) 3 (2) 4.0 (3) 32.0 (4) 0411mid

Problem 5. 16 marks

Convert the following mathematical formulas to Fortran expression:

$$(1) \frac{10t \cos \alpha - 24t}{\sqrt{\alpha t + 100}} + 3.5t.$$

`(10.0*t*cos(a)-24.0*t)/(sqrt(a*t)+100.0)+3.5*t`

$$(2) \frac{4\pi^2 l h}{\tau^2} \sqrt{h^2 \cos^4 \left(\frac{2\pi t}{\tau} \right) + \sin^2 \left(\frac{2\pi t}{\tau} \right)}.$$

`4*pi*pi*l*h/(tau*tau)*sqrt(h*h*(cos(2*pi*t/tau))**4
+(sin(2*pi*t/tau))**2)`

Problem 6. 18 marks

Indicate the output of the following segments of Fortran program:

```
integer :: a=4, b=3, c=1
If (.not.(a > b).or.(a<=c)) then
  print*,a+b+1
else if(.not.(a > b+c)) then
  print*,a
else
  print*,a+c
end if
```

The output is: 4

```
Character(10) :: Name="John Q. Doe", Cours="Fortran 90"
real :: mid=19.5, assin=25.5, fin=43.5
print 10, Name, Cours,"Assignments:",assin,"Midterm",mid,"Final exam:",fin,&
mid+assin+fin
10 Format(1x,"Name:",A,"Course:",A / 3(1x,A,f4.1) / T20, "Grade:",f4.2)
```

The output is: (Using \emptyset to indicate a blank)

```
Name:John Q. DoeCourse:Fortran 90
Assignments:25.5 Midterm19.5 Final exam:43.5
          Grade:****
```

Problem 7. 16 marks

The following is part of a Fortran program calculating the value of $f(x)$, where

$$f(x) = \begin{cases} \frac{\sin(x-1)}{x-1} & x > 0, x \neq 1 \\ x & x = 0 \text{ or } 1 \\ 10 & x < 0 \end{cases}$$

Complete the program.

Program function

```
implicit none
```

```
real::x, fun !fun is the value of f(x)
```

```
print*,"Please input a real number x (|x|<1000):"
```

```
read*,x
```

```
!-----
```

```
    if(x<0) then
```

```
        fun=10.0
```

```
    else if(x==0.0 .or. x==1.0) then
```

```
        fun=x
```

```
    else
```

```
        fun=sin(x-1)/(x-1)
```

```
    end if
```

```
!-----
```

```
print'(1x,"The value of f(",f7.2,")=",f7.2)',x,fun
```

```
!-----don't forget the following
```

```
END PROGRAM function
```

Assume the input is -3.2 , write down the output below:

The value of $f(-3.20) = 10.00$

Problem 8. 20 marks

Suppose the starting salary for a beginning teacher is \$ 45,000 per year. Assume that the continuously compounded average annual inflation rate is 5 %, but the ceiling of the salary is \$ 80,000. Write a Fortran program which reads a name of a teacher and the number of years he/she has worked, output the current salary. The output looks like:

John Q. Doe has been teaching 25 years. Salary: \$ 80000 /year.

The source codes are as follows.

```
Program SalaryCount
implicit none
integer::salary,years
character(20)::name
character(1)::response
implicit none
do
  print*,"Name of the teacher?"
  read*,name
  print*,"How many years has he/she taught?"
  read*,years
  salary=int(real(45000)*(1+0.05)**years)
  if(salary>80000) salary=80000
  print 10,name,years,salary
  print*,"Calculate more salary?"
  read*,response
  if(response/="Y") exit
end do
10 format(1x,A," has been teaching",1x,I3,1x,"years."&
  "Salary:$",I5,"/year")
end program SalaryCount
```