FORTRAN Programming for Engineers

Name: 

SSN: 

Signature: 

If you want your grades posted, enter a 4 character code: 

Circle Lab Day and Circle Lab Time:

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Your test should have twelve (12) questions on eight (8) pages, including this title page. The test is divided into two parts. The first part consists of ten (10) multiple choice questions, each worth five (5) points. The second part consists of two (2) write code questions, worth twenty (20) and thirty (30) points each. No calculators may be used during the exam. You have fifty minutes to complete this test. Use your time wisely. Good Luck!!! Note: None of your questions can be answered during the final 10 minutes of the test.

SCORE: Possible Points

Part 1 50 pts 

Question 11 20 pts 

Question 12 30 pts 

TOTAL: 100 pts
PART ONE. Each question is worth 5 points each. **Place your answers on the line near the question number.** You may assume there are no syntax errors in any code fragment except when explicitly asking for syntax errors. Also, any undeclared variables are of type integer.

1. Given the following declaration statements:

   logical weather
   parameter (weather = .true.)
   real x, y

   For what values of x and y will the following condition be true?

   \((y \gt . x) \land (\neg \text{weather})\)

   a. When \(y > x\)
   b. When \(x > y\)
   c. It is always true.
   d. It is never true.
   e. None of the above.

2. Given the following code:

   real x, y, z
   integer a
   parameter (a = 10)

   if (x .lt. a) then
       y = x**2
       z = sqrt (y)
   else
       z = a
   end if

   Which of the following statements is true?

   a. When \(x\) is greater than or equal to 10, then \(z = 10\)
      and when \(x\) is less than 10, then \(z = x\)
   b. When \(x\) is greater than or equal to 10, then \(z = x\)
      and when \(x\) is less than 10, then \(z = 10\)
   c. When \(x\) is greater than or equal to 10, then \(z = 10\)
and when x is less than 10, then $z = y$

d. None of the above.
3. What is output by the following code?

```fortran
integer x, y, z
x = 0
y = 5
z = 1
if (x .eq. y) then
  if (x .lt. 0) then
    z = z + 1
  else
    z = z - 1
  endif
else
  if (x .ne. 0) then
    z = z + 2
  else
    z = z - 2
  endif
endif
print *, z
```

a. -1  b. 0  c. 1  d. 2  e. 3

4. What is output by the following code?

```fortran
integer i, j, k
i = 3
j = 0
do 10 k = 1, i, -1
   j = j + 1
10 continue
print *, j
```
a. 4
b. 3
c. 2
d. 1
e. 0
5. What is output by the following code? Assume fee and speed are both integers with values of fee = 0 and speed = 75.

```fortran
if (speed .gt. 35) then
  fee = 20
else if (speed .gt. 50) then
  fee = 40
else if (speed .gt. 65) then
  fee = 60
end if
print *, speed
```

a. 0  
   b. 20
   c. 40 
   d. 60 
   e. None of the above.

6. Consider the following program:

```fortran
program prog
  integer i, j, k, l, m, n
  read *, i, j
  read *, k, l, m
  read *, n
  print i, j, k, l, m, n
end
```

Assume the content of the file "data" is as follows:

```
1 2 3 4 5
6 7
8 9 10
11 12
13 14
```

What does the program print on the terminal screen when the program is run using the following command? (Assume the program is compiled correctly to the file "a.out").

```bash
a.out < data
```

a. 1 2 6 7 8 11 
   b. 1 2 3 4 5 6
c. 1 2 6 7 8 9

d. Nothing, because the output is written into the file "out".

e. None of the above.
7. What is output by the following code?

```
print *, 'Hello'
do 10 i = 5, 2, -2
   print *, 'i = ', i
10 continue
print *, 'Bye'
```

a. Hello     b. Hello
   i = 5      i = 5
   Hello     i = 3
   i = 3      i = 1
   Bye       Bye

c. Hello     d. Hello
   i = 5      i = 5
   Bye       i = 3
   Hello     Bye
   i = 3
   Bye

e. None of the above

8. What is output by the following code? Assume `sum` and `i` are integer variables.

```
sum = 0
i = 1
do while (i .le. 15)
   if (i .lt. 5) then
      sum = sum + 1
   end if
   if (i .lt. 10) then
      sum = sum + 2
   end if
   if (i .lt. 15) then
      sum = sum + 3
   end if
   i = i + 3
end do
print *, sum
```
a. 10
b. 13
c. 23
d. 26
e. None of the above.
9. Which of the following condition expressions evaluate to true? Assume \( \text{val1} = 5, \text{val2} = 10 \) and \( \text{val3} = 15 \).

   (1) \( \text{val1} \lt \text{val2} \land \text{val2} \equiv 7 \lor \text{val3} \neq 15 \)

   (2) \( \text{val1} \lt \text{val2} \land \text{val3} \equiv \text{val2} + \text{val1} \lor \text{val2} \equiv \text{val1} \)

   (3) \( \text{val1} \lt \text{val3} - \text{val1} \land \text{val2} \lt \text{val1} \lor \text{val2} \equiv \text{val1} \times 2 \)

   a. Expression (1) only
   b. Expression (2) only
   c. Expression (3) only
   d. Expressions (2) and (3)
   e. Expression (1), (2) and (3)

10. What does the following expression evaluate to? Assume the variable \( \text{a} \) is of type integer and has value of 7, and variable \( \text{b} \) is of type real and has value of 3.3.

   \[
   \frac{\text{a}}{2} + 4 \times \frac{\text{b}}{3}
   \]

   a. 8.25
   b. 7.4
   c. 7.7
   d. 7.9
   e. None of the above.
PART TWO. This part consists of one short answer and one write code question. This part is worth a total of fifty (50) points.

11. (20 points) Define what a syntax error is and how syntax errors are detected.

Find all of the syntax errors in the following program and explain why each one is a syntax error.

```fortran
program findit
  implicit none
  integer a, b
  parameter (a = 10,000, b = 400)
  real x, y, z, w
  print*, 'Type in a number'
  read *, x, w
  print 35, 'Type in another number'
  read *, y
  z = (a+b) * (x/y) ** 2
  w = |z|
  print *, 'The result is ', w
stop
```

12. Write a complete program that will read in 5 integer values, then determine the two largest values of the 5 input values and finally print out these two largest values. Your program must prompt the user to inform how the input must be entered and must echo the input. All output must be printed in some readable manner. You do not have to write comments or a header block for this program. (30 points)