Midterm Exam #1
(Close-book, 45 Minutes)

Student ID: ___________________ Student Name (Print): _________________________________

Your paper will not be graded unless you endorse the following statement:
I have neither given nor received inappropriate assistance on this quiz.

Student Signature: ________________________________________________________________

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**Multiple Choice**: There is ONLY one correct answer in each of the following 6 problems. Write your choice in the Answer box.

1. Select the decimal value of a binary number: **0000 1001_2**
   
   A. 7  
   B. 9  
   C. 11  
   D. 13

2. Select the program that can convert a Fortran 95/2003 source code into an executable code:
   
   A. Plain text editor *notepad.exe*  
   B. Debugger program *gdb.exe*  
   C. Fortran compiler *g95.exe*  
   D. Web browser program *iexplore.exe*

3. When an executable file is activated in the operating system, which computer hardware device will store the binary instruction codes during runtime?
   
   A. Random Access Memory  
   B. Central Processing Unit  
   C. Keyboard  
   D. Monitor

4. User-defined Identifiers need to follow naming rules. Select the **valid variable identifier** that the compiler can recognize:
   
   A. *distance in miles*  
   B. *1stDistance*  
   C. *distance_1*  
   D. *distance+

5. The value held by an variable can be changed by an **assignment statement**. Select the **INVALID** assignment that compiler cannot translate into corresponding binary code:
   
   A. *timePerSecond = distance / velocity*  
   B. *gauss = 1 / 2pi * exp(-x*x)*  
   C. *celsius = 5.0/9.0*(fahrenheit-32.0)*  
   D. None of the above.

6. In programming, **Keywords** are words preserved by a programming language to serve for special purposes. Which of the following Fortran 95/2003 keyword can be used to begin a main program?
   
   A. *Implicit None*  
   B. *Read*  
   C. *Write*  
   D. *Program*
7. **Compiling command**: Assume that a Fortran 95/2003 program is implemented in a source file named `p7.f95`, now you need to compile this source code into its binary form in an executable file named `p7.exe`. Write down clearly the compiling command you would enter in Emacs in the Adler lab computer systems. (Note that each line segment indicates one character space.)

```
g95 p7.f95 -o p7.exe
```

8. **I/O statements**: Assume that a Fortran 95/2003 program needs to get an input of the user's year of birth. A variable named `dobYear` has been declared as follows:

```
integer::dobYear=1900
```

Please write Fortran 95/2003 statements that can prompt user what to enter, and store user input into the variable `dobYear`

```
Write(*,*) "Please enter the year in which you were born (in 4 digits)"
Read(*,*) dobYear
```

9. **Assignment statement**: Read the following partial code written in Fortran 95/2003:

```
integer::y=0        !line 2
real   ::x=-3.4     !line 3
y = abs(x-1) * 2.0  !line 4
```

Note that `abs` is the name of a Fortran intrinsic function that calculates the absolute value of an input. Predict the value stored in variable `y` after the execution of the assignment statement (You can write down your calculation steps for partial credit.)

```
|-3.4-1|*2 = 4.4*2 = 8.8, then with integer truncation, the answer is 8
```
10. **Debug syntax errors:** In the following snapshot of Emacs, the top window displays a Fortran 95/2003 program that calculates the area of a circle given the user input of its radius. The bottom window displays the compilation buffer after invoking the compiling command. Please fix the syntax error by filling out the error correction form below.

![Compilation Buffer](image)

<table>
<thead>
<tr>
<th>Line # of the error</th>
<th>Corrected Statement</th>
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<tbody>
<tr>
<td>7</td>
<td>read(<em>,</em>) radius</td>
</tr>
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</table>
11. **Problem Solving in Fortran 95/2003**  
Engineers often measure the ratio of two power measurements in **decibels**, or dB. The equation for the ratio of two power measurements in decibels is

\[
\text{dB} = 10 \log_{10} \left( \frac{P_2}{P_1} \right)
\]

where \( P_2 \) is the power level being measured, and \( P_1 \) is the reference power level. Develop a Fortran 95/2003 program that accepts an input power \( P_2 \), then convert it into dB with respect to a constant reference power \( P_1 \) of \( 10^{-6} \) Watts. Please use named constant for the reference power.

### Program Development Form

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<tr>
<th>Program Input</th>
<th>P2 power level in watts in real type</th>
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<tbody>
<tr>
<td>Program Output</td>
<td>dB measure of P2 in real type</td>
</tr>
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### Implementation in Fortran 95/03

```
Program main
!name your main program identifier above
Implicit none

real :: P2, dB
!Declare both input and output variables above

real, Parameter :: P1 = 1e-6
!Declare the reference power as a named constant above

write(*,*), "Please enter a power value in watts"
!Display user prompt message above

read(*,*), P2
!Get user input value above

dB = 10 * log10(P2 / P1)
!Implement the dB formula above, you can use intrinsic function log10.

write(*,*), "The dB measurement of your input power level is ", dB
!Display result above

End Program
```