Write your name ONLY on this cover page.

Turn off cell phones, pagers, calculators and anything that makes a noise or can be used for computing.

Nothing is allowed on the desk top but the test, pens, pencils, erasers, and snacks.

Do not ask a question in a way that gives away the answer to the test question.

In any code that you write on this test, you do not have to write comments or print statements that explain what the program does. Just write enough code to do what is asked.

If the code requires import statements, you must write the import statement.
Exam 1 Material
1. (9 points) In the blank to the right, write the value that Python would calculate. If an error would be produced, write the word error and circle the place in the expression that the error arises. If a value is a string you must show quote marks around the string.

   a. \(15 \div 4\)  
   b. \(10 \div 4 \times 3\)  
   c. \(-3 \times 2\)  
   d. \(8 \times 3 - 3 \times 2\)  
   e. \(17 \% 5\)  
   f. "$5" + "2"$  
   g. "$5" \times 3 + "2"$  
   h. \(5 + 2 \times 3\)  
   i. "$X" + "" + "Z"$  

2. (18 points) What is the output of each of the following code segments? Indicate spaces as appropriate using an underscore character in the previous problem.
   a. (2 pts) for i in range(3):
      print (i)

   b. (4 pts) for i in range(1,3):
      print (i)

   c. (4 pts) for i in range(1, 7, 2):
      print (i)

   d. (4 pts) s = 0
      N = eval(input("Enter an integer: "))  
      [assume 4 is entered]
      for i in range(N):
         s = s + i
      print(s)
4. (4 pts) \( p = 1 \\
N = \text{eval}(\text{input}("\text{Enter an integer: }")) \) [assume 4 is entered]

for i in range(1,N):
    p = p * i
    print (i,p)

3. (12 points; 6 each) For the following binary/decimal conversions assume the leftmost bit is the sign bit.
   a. Represent the decimal number 38 in a byte.
      "_________________________"

   b. Represent the binary number 10101101 as a base 10 integer.
      "_________________________"

4. (6 points) A positive integer is stored in 16 bits. Using base 2 notation what is the range of integer values? You can assume that the integer cannot be negative.

   "___________________________________________________________________"
5. (10 points; 5 each) What is the output of each of the following code segments? **Indicate spaces as appropriate using an underscore character.**

   a. for i in "APPLE":
      print (i.lower(), end = "#")

   b. for item in ["XYZ","A","B","C"]:
      print (item[1])

6. (6 points total) Consider the code. Show what is printed by the following code

   words = ["The", "knights", "who", "say", "NI!"]
   X = []
   for i in range(0,2,len(words)):
      X.append(words[i])
   print (`, `.join(X))

7. (5 points) Write a code segment that prompts a user for 20 numbers, one value at a time, saves the numbers in a list, and then prints a 2-column table with each number in the list entered in the first column and its square root in the second column. Each column should be 6 characters wide and the values in each column should have their decimal points aligned and 3 places after the decimal point.
8. (5 points) Write a code segment that prompts the user for n and then calculates the n!. Remember n! = n*(n-1)*(n-2) ... 1

11. (12 points; 2 each) Assuming the assignment statement:

   text = “I love this class”

   What is the value of x in each of the following?

   a. x = text.find(“e”)  
      x = ______________

   b. x = text.split(“s”)  
      x = ______________

   c. y = text.split(“ ”) 
      x = len(y[0])  
      x = ______________

   d. x = chr(ord(text[0]))  
      x = ______________

   e. x = text[0:4]  
      x = ______________

      x = ______________
1. (6 points) Sketch the result of the following code after completion in the “window” below. Briefly explain the result.

```python
win = GraphWin("Test", 200, 200)
ptA = Point (100,100)
ptA.draw(win)
ptB = ptA
ptB.move(75, 75)
```

Test

```
    |
  ---
```

The code draws a point at (100, 100) and then moves it to (175, 75), resulting in a square in the window with a point at the top left corner moved to the new position.
2. (10 points) Append to the following segment of code additional lines that:
   • Will wait until the user clicks the mouse in the window and then calculates the distance from the center of the window to the point where the user clicked. **If you do not know how to determine this distance you may use the value 15 for the purposes of the rest of the problem, but will incur a deduction for this portion of the problem.**
   • Draws a circle whose center is at the center of the window and such that the point where the user clicked is on the circumference of the circle.
   • The program will also create a **Text** object near the bottom of the window (the exact location and size of the Text object are yours to determine, but it must lie reasonably close to the bottom of the window) and display in it the message “**Radius of the circle is**” and then the appropriate radius of the circle.
   • Upon receiving an additional mouse click the window will close.

```python
from graphics import *
from math import *

def main():
    win = GraphWin("CSCI220", 400, 200)
```
3. (6 points) Assuming a file “data.txt” exists that contains the numeric ages of all of the College of Charleston students, one age each per line. Write a code segment that finds the average age of all of the students.

4. (10 points) Write a segment of code that opens the file Test2-4.in and copies its contents to the file Test2-4.out except all the letters in the file are in upper case.
5. (4 points) Assume this code has been written:

```python
def add(op1, op2):
    return op1 + op2

def main():
    total = add(4, 5)
```

In the above code, label an example of each of the following:

a. parameter
b. argument
c. function call
d. return statement

6. (6 points) The area of two circles have been calculated and stored in two `float` variables, `area1` and `area2`. Write a code segment that prints, as appropriate, “Same size” or “Different sizes”
7. (6 points) Phil the philosoraptor needs a Boolean function that tests the ending character in a string. Write the function `endswith(text, chr)`, that accepts two values, `text` which is a string and `chr` which is a single character stored as a string. This function should return `True` if the last character in `text` is equal to `chr` and `False` otherwise.
8. (6 points) Evaluate the following Boolean expressions:

\[
\begin{align*}
7 & \geq 7 \\
7 & < 20 \text{ and } 18 \geq 20 \\
20 & \neq 20 \\
7 & = 7 \text{ or } 20 < 18 \\
(13 & > 4 \text{ or } 15 \leq 40) \text{ and } 4 = 7 \\
(10 & < 5 \text{ and } 40 > 20) \text{ or } 18 \geq 10
\end{align*}
\]

9. (12 points) A, B, and C are Boolean variables. Write a truth table for the following expressions:

a. (4 points)

\((\text{not } A) \text{ and } B\)

b. (8 points)

\(A \text{ and } (\text{not } B \text{ or } C)\)
10. (10 points) To earn a starting position on the wrestling team, a player must meet at least one of the following conditions:

   a. His weight is equal to or more than 150 and less than 160, and he has won 5 or more matches
   b. His weight is more than 199, or his number of wins is greater than 20

Write a Boolean function, shouldStart(weight, numWins), that accepts two values, weight which is float representing a player’s weight and numWins which is an int representing the number of wins the player has had. The function should return True if the player should start based on the above statements and False otherwise.
16. (12 points) Consider the following code segment.

```python
if h >= mH:
    if w >= mW:
        print("Eligible")
    else:
        print("Too light")
elif w >= mW:
    print("Too short")
else:
    print("Too short and light")
```

j. (3 points) What will the code segment write if h = 60, mH = 55, w = 130 and mW = 125.

k. (3 points) What will the code segment write if h = 50, mH = 55, w = 130 and mW = 125.

l. (6 points) Rewrite the code so that it uses only nested if-else statements, and not an elif clause.
17. (12 points) Using an indefinite loop (i.e., while), write a program that asks the user for a list of numbers that is not known at the start of the program. The user will enter a blank line when they are done entering numbers. Calculate the average of all of the numbers entered by the user. Also, during the execution of the while loop, keep track of the maximum and minimum value seen. You may NOT use the built-in Python max and min functions!
18. (12 points) Define a class, Student, to represent a student at C of C.
   a. The data to maintain for a student is their name and grades. Create a construction
      which accepts the student’s name and initializes a list of grades to [].
   b. Write accessor methods for the attributes (get functions).
   c. Write a mutator method for the name (set functions).
   d. Write a method add_grade that accepts a float and adds a new grade to the list
      of grades. The method should not return a value.
   e. Write a method average_grade() that returns the average grade for the
      student.
   f. Write a method to represent the student as a string (name and average grade).
      Make sure that your average grade is properly formatted to have only two digits
      after the decimal.
19. (6 points) Write a program that does basic testing of the methods from your Student class.

20. (10 points) Show me an implementation of one of the following sorting functions: insertion, bubble, or selection (your choice).
21. (6 points) Describe the procedure behind bubble sort.

22. (6 points) Describe the procedure behind selection sort.

23. (6 points) Describe the procedure behind insertion sort.

24. (10 points) Show me an implementation of linear search.
25. (10 points) Show me an implementation of binary search.