1. TRUE / FALSE QUESTIONS

T Reducing duplication of code is one of the advantages of using a loop structure.

T A good way to repeatedly perform an operation is to write the statements for the task once and then place the statements in a loop that will repeat as many times as necessary.

T In a flowchart, both the decision structure and the repetition structure use the diamond symbol to represent the condition that is tested.

F ~~T~~ Both of the following for clauses would generate the same number of loop iterations.

```
for num in range(4):
for num in range(1, 5):
```

F A while loop is called a pretest loop because the condition is tested after the loop has had one iteration.

F ~~T~~ A condition-controlled loop always repeats a specific number of times.

T The if selection structure performs an indicated action when the condition is true.

F ~~T~~ The if/else selection structure is a single-selection structure.

F A fatal logic error causes a program to execute and produce incorrect results.

T A repetition structure performs the statements in its body while some condition remains true.

T Function float converts its argument to a floating-point value.

T The exponentiation operator ** associates left to right.

F ~~T~~ Function call range(1, 10) returns the sequence 1 to 10, inclusive.

F ~~T~~ Sentinel-controlled repetition uses a counter variable to control the number of times a set of instructions executes.

2. COMPLETION QUESTIONS: Fill in the blanks.

a) A(n) repetition structure causes a set of statements to execute repeatedly.

b) A(n) condition-controlled loop causes a statement or set of statements to repeat as long as the condition is true.

c) A(n) infinite loop usually occurs when the programmer does not include code inside the loop that makes the test condition false.

FOR **d)** In Python, you would use the ~~Running~~ statement to write a count-controlled loop.

e) The following for loop iterates 4 times to draw a square.

```
for x in range(4):
    turtle.forward(200)
    turtle.right(90)
```

f) The IF statement is used to create a single-alternative decision structure.

g) A(n) if-else statement will execute one block of statements if its condition is true or another block if its condition is false.

h) The logical NOT operator reverses the truth of a Boolean expression.

LOGICAL **i)** A(n) ~~COMPOUND~~ expression is made up of two or more Boolean expressions.

j) The while loop is known as a(n) pretest loop because it tests the condition before performing an iteration.

k) The acronym __GIGO__ refers to the fact that the computer cannot tell the difference between good data and bad data.

l) A(n) __Input__ validation loop is sometimes called an error trap or an error handler.

m) The __range__ function is a built-in function that generates a list of integer values.

n) The if/elif/else structure is a __conditional__ structure.

o) Sentinel-controlled repetition is called __indefinite rep__ because the number of repetitions is not known before the loop begins executing.

p) The augmented assignment symbol *= performs _____.

q) Function __sequence__ creates a sequence of integers.

r) All programs can be written in terms of three control structures, namely __sequence__, __selection__ , and __repetition structure__.

s) A __flowchart__ is a graphical representation of an algorithm.

3. ALGORITHM WORKBENCH QUESTIONS

a) Write Python code that changes the turtle's pen size to 4 if it is presently less than 4.

b) Write a `for` loop that uses the range function to display all odd numbers between 1 and 100.

c) Write a `for` loop that uses the range function to display all even numbers between -100 and 100 inclusively in descending order.

d) Write a while loop that lets the user enter a number. The number should be multiplied by 10, and the result assigned to a variable named `product`. The loop should iterate as long as product is less than 100.

e) Write a while loop that asks the user to enter two numbers. The numbers should be added and the sum displayed. The loop should ask the user if he or she wishes to perform the operation again. If so, the loop should repeat, otherwise it should terminate.

f) Write Python code that inputs three numbers from the screen. Code should do an input validation for the 3-entered numbers so that all of them are positive numbers. Otherwise it should ask to enter three of them again and again until all of the entered numbers are positive.

MULTIPLE CHOICE QUESTIONS

4. GIGO stands for _____.

a) great input, great output

b) garbage in, garbage out

c) GIGahertz Output

d) GIGabyte Operation

5. What type of loop structure repeats the code a specific number of times?

a) condition-controlled loop
b) number-controlled loop
c) count-controlled loop
d) Boolean-controlled loop

6. What type of loop structure repeats the code based on the value of Boolean expression?

a) condition-controlled loop
b) number-controlled loop
c) count-controlled loop
d) Boolean-controlled loop

7. What are the values that the variable `num` contains through the iterations of the following for loop?

```
for num in range(4):
```

a) `1, 2, 3, 4`
b) `0, 1, 2, 3, 4`
c) `1, 2, 3`
d) `0, 1, 2, 3`

8. When will the following loop terminate?

```
while keep_on_going != 999:
```

a) when `keep_on_going` refers to a value less than 999
b) when `keep_on_going` refers to a value greater than 999
c) when `keep_on_going` refers to a value equal to 999
d) when `keep_on_going` refers to a value not equal to 999

9. Each repetition of a loop is known as a(n) _____.

a) cycle
b) revolution
c) orbit
d) iteration

10. Which of the following is *not* an augmented assignment operator?

a) *=
b) /=
c) +=
d) <=

11. A variable used to keep a running total is called a(n)_____.

a) Accumulator
b) Total
c) running total
d) Summer

12. _____ is the process of inspecting data that has been input into a program in order to ensure that the data is valid before it is used in a computation.

a) Input validation
b) Correcting data
c) Data validation
d) Correcting input

13. How many asterisks does the following code fragment print?

```
a = 0
while a < 100:
    print('*', end='')
print()
```

infinite

14. Which of the following represents an example to calculate the sum of numbers (that is, an accumulator), given that the number is stored in the variable number and the total is stored in the variable total?

a) total + number = total
b) number += number
c) total += number
d) total = number

15. What will be displayed after the following code is executed?

```
total = 0
for count in range(4,6):
    total += count
    print(total)
```

a)
```
4
9
```
b)
```
4
5
```
c)
```
6
4
```
d)
```
5
9
```

16. What will be displayed after the following code is executed?

```
for num in range(0, 20, 5):
    num += num
print(num)
```

a) 30
b) 25
c) 0 5 10 15 20
d) 5 10 15

PROGRAMS

17. Conversion from kilograms to pounds and pounds to kilograms: Write a program that displays the following two tables side by side (note that 1 kilogram is 2.2 pounds and that 1 pound is .45 kilograms):

kilograms	pounds	pounds	kilograms
10	22.0	20	9.09
20	44.0	35	15.91
30	66.0	50	22.73
40	88.0	65	29.55
50	110.0	80	36.36
60	132.0	95	43.18
70	154.0	110	50.00
80	176.0	125	56.82
90	198.0	140	63.64
100	220.0	155	70.45

18. At one college, the tuition for a full-time student is $8,000 per semester. It has been announced that the tuition will increase by 3 percent each year for the next 5 years. Write a program with a loop that displays the projected semester tuition amount for the next 5 years.

19. Running on a particular treadmill you burn 4.2 calories per minute. Write a program that uses a loop to display the number of calories burned after 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, and 60 minutes in tabular form.

20. Compute π : You can approximate by using the following series:

$$\pi = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \cdots + \frac{(-1)^{n+1}}{2n-1}$$

Write a program that displays the π value for *n* = 10000, 20000, . . ., and 100000.

21. (*Find numbers divisible by 5 or 6, but not both*) Write a program that displays, ten numbers per line, all the numbers from 100 to 200 that are divisible by 5 or 6, but not both. The numbers are separated by exactly one space.

22. (*Sum a series*) Write a program to sum the following series then prints the result to the screen:

$$\frac{1}{3} + \frac{3}{5} + \frac{5}{7} + \frac{7}{9} + \frac{9}{11} + \frac{11}{13} + \ \ldots \ + \frac{95}{97} + \frac{97}{99}$$

23. A person invests $1000 in a savings account yielding *5 percent interest*. Assuming that all interest is left on deposit in the account, calculate and print the amount of money in the account at the end of each year for 10 years. Use the following formula for determining these amounts:

$$a = p\,(1 + r)^n$$

where

p is the original amount invested (i.e., the principal),

r is the annual interest rate,

n is the number of years and

a is the amount on deposit at the end of the n^{th} year.

Program Output of your program should be as below:

```
Year      Amount on deposit
   1              1050.00
   2              1102.50
   3              1157.63
   4              1215.51
   5              1276.28
   6              1340.10
   7              1407.10
   8              1477.46
   9              1551.33
  10              1628.89
```

24. The distance a vehicle travels can be calculated as follows:

```
distance = speed x time
```

For example, if a train travels 40 miles per hour for three hours, the distance traveled is 120 miles.

Write a program that asks the user for the speed of a vehicle (in miles per hour) and the number of hours it has traveled. It should then use a loop to display the distance the vehicle has traveled for each hour of that time period.

An example of the desired output of the program shown below:

```
What is the speed of the vehicle in mph? 40 Enter
How many hours has it traveled? 5 Enter
Hour   Distance-Traveled
1            40.00
2            80.00
3           120.00
4           160.00
5           200.00
```

25. Write a program that calculates x raised to the y power (xy). The program inputs the base and the power then prints the result to the screen.

The terminal output of the program should look as below.

```
Enter the number: 3
Enter the power: 4
4 th power of 3 is 81.
```

Hint: n^{th} power of a number is the multiplication of the number by itself N times.