1. Write Python code that prompts the user for the area of a circle and prints out its circumference. Useful formulas: $area = \pi \cdot radius^2$, $circumference = \pi \cdot diameter$

2. Trace the Python code below, i.e. indicate the state of the variables as they change.

```
mon = 5
tue = (mon + 6) % 2
tue = tue + 3
wed = mon / 4
thu = mon ** 2
wed = mon = tue
thu = mon - 2 * tue
tue = wed * mon
mon, tue = tue, mon
```

3. Write the following formulas in Python:

   (a) $x = \frac{-b+\sqrt{b^2-4ac}}{2a}$

   (b) $s = \frac{a+b+c}{2}$

   $$area = \sqrt{s(s-a)(s-b)(s-c)}$$

4. Write for loop based Python code to calculate:

   (a) The product of all the integers from 10 to 100.

   (b) 3.145^{101}.

5. Write a Python graphics based program that requires the user to click on a point in its window and then draws a 2 by 2 rectangle centered around that point.

6. Write for loop based Python code to do the following:

   (a) Print out the multiples of 5 from 205 to 305 inclusive.
       Note: the first thing printed will be 205 and the last thing printed will be 305.

   (b) Print the following output:

```
Month 1 has 31 days.
Month 2 has 28 days.
Month 3 has 31 days.
Month 4 has 30 days.
Month 5 has 31 days.
Month 6 has 30 days.
Month 7 has 31 days.
Month 8 has 31 days.
Month 9 has 30 days.
Month 10 has 31 days.
Month 11 has 30 days.
Month 12 has 31 days.
```

7. Write a Python graphics based program that requires the user to click on three points in its window and then draws the triangle connecting those points.

8. Trace the following Python code, i.e. indicate the state of the variables as they change and what output is printed to the screen:

(a)
```
f = 3
s = 5
for i in range(10,15):
    f, s = s, f + s
    print("f =", f, " s=", s)
```

(b)
```
n = 3
k = 4
for c in range(5):
    n = n + k
    k = 3 * k
    print("n =", n, " k = ", k)
```

9. Draw the output that would be displayed in the program's window if the following Python graphics based program were executed:

```
from graphics import *

def main():
    win = GraphWin()
    win.setCoords(0, 0, 100, 100)
    for n in range(10, 100, 10):
        Line(Point(n,0), Point(n,100)).draw(win)
    for n in range(10, 100, 10):
        Line(Point(0,n), Point(100,n)).draw(win)

    win.getMouse()

main()
```

10. Write a **complete** program that uses a loop to help ask the user for the quantity and cost of each of 10 items. The program should then print out the total cost.
An example run of the program should look like:

```
Item 1:
Enter quantity -> 3
Enter cost     -> 10
Item 2:
Enter quantity -> 10
Enter cost     -> 2.30
Item 3:
Enter quantity -> 4
Enter cost     -> 5
:
:
Item 10:
```

```
Enter quantity -> 6
Enter cost     -> 8.50

Your total cost is:  201.18
```

1. Write Python code that prompts the user for the diameter of a circle, and prints out the circumference of the circle. Useful formulas: $circumference = \pi \cdot diameter$

2. Trace the Python code below, i.e. indicate the state of the variables as they change.

```
mon = 7
tue = (mon + 6) % 2
tue = tue + 3
wed = mon % 4
thu = mon ** 2
wed = thu = mon + 2
thu = mon - 2 * tue
tue = wed * mon
mon, tue = tue, mon
```

3. Write the following formulas in Python:

   (a) $dist = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

   (b) $area = \frac{3\sqrt{3}}{2} side^2$

   $apothem = \frac{2area}{6side}$

4. Write for loop based Python code to calculate:

   (a) The product of all the integers from 20 to 200.

   (b) 5^{100}.

5. Write a Python graphics based program that requires the user to click on four points in its window. The program then draws, in its window, the quadrilateral connecting these four points in the order in which they were entered and closing at the first and last points entered.

6. Write for loop based Python code to do the following:

   (a) Print out the multiples of 7 from 77 to 700 inclusive.
       Note: The first thing printed will be 77 and the last thing printed will be 700.

   (b) Print the following output:

```
City 1 has 30 flights.
City 2 has 2 flights.
City 3 has 12 flights.
City 4 has 24 flights.
City 5 has 31 flights.
City 6 has 44 flights.
City 7 has 3 flights.
City 8 has 33 flights.
City 9 has 8 flights.
```

7. Write a Python graphics based program that requires the user to click on two points in its window. The program then draws the axis aligned rectangle for which those two points are in opposing corners along with **both** diagonals of this rectangle.

8. Trace the following Python code, i.e. indicate the state of the variables as they change and what output is printed to the screen:

(a)
```
f = 5
s = 8
for i in range(2,7)
    f, s = s, f + s
    print("f =", f, " s=", s)
```

(b)
```
n = 16
k = 4
for c in range(5):
    n = n - c
    k = k + n
    print("n =", n, " k = ", k)
```

9. Draw the output that would be displayed in the program's window if the following Python graphics based program were executed:

```
from graphics import *

def main():

    win = GraphWin("Picture", 400, 400)
    win.setCoords(0,0,100,100)

    left    = Point(10,50)
    right   = Point(90,50)
    bottom = Point(50,10)
    top     = Point(50,90)

    Line(left,top).draw(win)
    Line(top,right).draw(win)
    Line(right,bottom).draw(win)
    Line(bottom,left).draw(win)

    win.getMouse()
    win.close()

main()
```

10. Write a **complete** program that uses a loop to help ask the user for the quantity and weight of each of 10 different types of cars. The program should then print out the total weight of all the cars.

1. Write Python code that prompts the user for the diameter of a circle, and prints out the area of the circle. Useful formulas: $area = \pi \cdot radius^2$, $diameter = 2 \cdot radius$

2. Trace the Python code below, i.e. indicate the state of the variables as they change.

```
mon = 9
tue = (mon + 6) % 2
tue = tue + 3
wed = mon % 4
thu = mon ** 2
wed = thu = mon + 2
thu = mon - 2 * tue
tue = wed * mon
mon, wed = wed, mon
```

3. Write the following formulas in Python:

   (a) $y = mx + b$

   (b) $area = 2(1 + \sqrt{2})side^2$

   $apothem = \frac{2area}{8side}$

4. Write for loop based Python code to calculate:

   (a) The product of all the integers from 100 to 200.

   (b) 3^{30}.

5. Write a Python graphics based program that requires the user to click on two points in its window. The program then draws the axis aligned rectangle for which those two points are in opposing corners **and** marks the center of the rectangle with a dot.

6. Write for loop based Python code to do the following:

   (a) Print out the multiples of 6 from 600 to 660 inclusive.
   Note: The first thing printed will be 600 and the last thing printed will be 660.

   (b) Print the following output:
   ```
   Train 1 arrives in 5 minutes.
   Train 2 arrives in 25 minutes.
   Train 3 arrives in 53 minutes.
   Train 4 arrives in 15 minutes.
   Train 5 arrives in 21 minutes.
   Train 6 arrives in 18 minutes.
   Train 7 arrives in 32 minutes.
   Train 8 arrives in 2 minutes.
   ```

7. Write a Python graphics based program that requires the user to click on two points in its window, thereby defining a circle and one of its radii. The program then draws both the circle centered on the first point and the radius between the two points.

8. Trace the following Python code, i.e. indicate the state of the variables as they change and what output is printed to the screen:

(a)
```
f = 1
s = 3
for i in range(12,17)
    f, s = s, f + s
    print("f =", f, " s=", s)
```

(b)
```
n = 3
k = 1
for c in range(5):
    n = c + k
    k = 2 * k
    print("n =", n, " k = ", k)
```

9. Draw the output that would be displayed in the program's window if the following Python graphics based program were executed:

```
from graphics import *

def main():

    win = GraphWin("Picture", 400, 400)
    win.setCoords(0,0,100,100)

    Circle(Point(50,50),40).draw(win)

    left   = Point(10,50)
    right  = Point(90,50)
    bottom = Point(50,10)
    top    = Point(50,90)

    Line(left,right).draw(win)
    Line(bottom,top).draw(win)

    win.getMouse()
    win.close()

main()
```

10. Write a **complete** program that, using a loop, asks the user for the number and cost of 10 items. The program should then print out the total cost.

1. Write Python code that prompts the user for the radius of a circle, and prints out the circumference of the circle. Useful formulas: $circumference = 2 \cdot \pi \cdot radius$

2. Trace the Python code below, i.e. indicate the state of the variables as they change.

```
mon = 2
tue = (mon + 4) % 2
tue = tue - 3
wed = mon % 2
thu = mon ** 3
wed = thu = mon + 2
thu = mon - 2 * tue
tue = wed * mon
mon, wed = wed, mon
```

3. Write the following formulas in Python:

   (a) $ave = \frac{a+b+c+d}{4}$

   (b) $area = 3(2 + \sqrt{3})side^2$

   $apothem = \frac{2 area}{12 side}$

4. Write for loop based Python code to calculate:

   (a) The product of all the integers from 2 to 50.

   (b) 2^{200}.

5. Write a Python graphics based program that requires the user to click on two points in its window. The program then draws a triangle formed by those two points and the origin.

6. Write for loop based Python code to do the following:

   (a) Print out the multiples of 8 from 240 to 800 inclusive.
   Note: The first thing printed will be 240 and the last thing printed will be 800.)

   (b) Print the following output:

```
Class 1 starts in 2 minutes.
Class 2 starts in 12 minutes.
Class 3 starts in 6 minutes.
Class 4 starts in 3 minutes.
Class 5 starts in 13 minutes.
Class 6 starts in 31 minutes.
Class 7 starts in 21 minutes.
Class 8 starts in 22 minutes.
Class 9 starts in 6 minutes.
```

7. Write a Python graphics based program that requires the user to click on one point and then draws a 50 by 50 square with the clicked point in its lower right corner.

8. Trace the following Python code, i.e. indicate the state of the variables as they change and what output is printed to the screen:

(a)
```
f = 8
s = 13
for i in range(2, 7)
    f, s = s, f + s
    print("f =", f, " s=", s)
```

(b)
```
n = 18
k = 1
for c in range(5):
    n = n - c
    k = 2 * k + c
    print("n =", n, " k = ", k)
```

9. Draw the output that would be displayed in the program's window if the following Python graphics based program were executed:

```
from graphics import *

def main():

    win = GraphWin("Picture", 400, 400)
    win.setCoords(0,0,100,100)

    one   = Point(10,10)
    two   = Point(90,90)
    three = Point(one.getX(), two.getY())
    four  = Point(two.getX(), one.getY())

    Rectangle(one,two).draw(win)

    Line(one,two).draw(win)
    Line(three,four).draw(win)

    win.getMouse()
    win.close()

main()
```

10. Write a **complete** program that, using a loop, asks the user for the time and speed for 10 legs of a trip. The program should then print out the total distance.

1. Write Python code that prompts the user for the area of a circle, and prints out the radius. Useful formulas: $area = \pi \cdot radius^2$

2. Trace the Python code below, i.e. indicate the state of the variables as they change:

```
mon = 2
tue = (mon + 6) % 2
tue = tue + 4
wed = mon / 4
thu = mon ** 3
wed = thu = mon + 2
thu = mon - 3 * tue
tue = wed * mon
mon, thu = thu, mon
```

3. Write the following formulas in Python:

   (a) $dist = |x_1 - x_2| + |y_1 - y_2|$

   (b) $area = 2(1 + \sqrt{2})side^2$

   $$apothem = \frac{2area}{8side}$$

4. Write for loop based Python code to calculate:

   (a) The product of all the integers from 100 to 190.

   (b) 1.9^{101}.

5. Write a Python graphics based program that requires the user to click on two points in its window. The program then draws an oval with those two points as opposing corners of the bounding rectangle **and** print out the length of the diagonal to the screen.

6. Write for loop based Python code to do the following:

   (a) Print out the multiples of 5 from 195 to 500 inclusive.
       Note: The first thing printed will be 195 and the last thing printed will be 500.)

   (b) Print the following output:
   ```
       Stop 1 is 207 street.
       Stop 2 is 200 street.
       Stop 3 is 190 street.
       Stop 4 is 181 street.
       Stop 5 is 175 street.
       Stop 6 is 168 street.
       Stop 7 is 161 street.
       Stop 8 is 145 street.
   ```

7. Write a Python graphics based program that requires the user to click on one points in its window. The program then draws a 30 by 30 square with the clicked point as the upper right corner.

8. Trace the following Python code, i.e. indicate the state of the variables as they change and what output is printed to the screen:

(a)
```
f = 3
s = 5
for i in range(11, 16)
    f, s = s, f + s
    print("f =", f, " s=", s)
```

(b)
```
n = 3
k = 2
for c in range(5):
    n = n + k / 2
    k = 3 * k
    print("n =", n, " k = ", k)
```

9. Draw the output that would be displayed in the program's window if the following Python graphics based program were executed:

```
from graphics import *

def main():

    win = GraphWin("Picture", 400, 400)
    win.setCoords(0,0,100,100)

    Line(Point(0,0),    Point(100,100)).draw(win)
    Line(Point(0,100), Point(100,0)).draw(win)
    Line(Point(0,50),   Point(100,50)).draw(win)
    Line(Point(50,0),   Point(50,100)).draw(win)

    win.getMouse()
    win.close()

main()
```

10. Write a **complete** program that, using a loop, asks the user for the distance and the speed for each of 10 legs of a trip. The program should then print out how long it took to complete the trip.

1. Write Python code that prompts the user for the radius of a circle, and prints out the area. Useful formulas: $area = \pi \cdot radius^2$

2. Trace the Python code below, i.e. indicate the state of the variables as they change:

```
mon = 5
tue = (mon - 5) % 2
tue = tue + 4
wed = mon % 4
thu = mon ** 2
wed = thu = mon + 3
thu = mon - 2 * tue
tue = wed * mon
mon, thu = thu, mon
```

3. Write the following formulas in Python:

   (a) $dist = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

   (b) $area = 3(2 + \sqrt{3})side^2$

   $$apothem = \frac{2area}{12side}$$

4. Write for loop based Python code to calculate:

   (a) The product of all the integers from 1000 to 1100.

   (b) 2.1^{10}.

5. Write a Python graphics based program that requires the user to click on two points in its window. The program then draws an oval with those two points as opposing corners of the bounding rectangle **and** puts a dot at the center of the oval on the screen.

6. Write for loop based Python code to do the following:

   (a) Print out the multiples of 3 from 33 to 330 inclusive.
       Note: The first thing printed will be 33 and the last thing printed will be 330.

   (b) Print the following output:

```
Stop 1 is 14 street.
Stop 2 is 18 street.
Stop 3 is 23 street.
Stop 4 is 28 street.
Stop 5 is 34 street.
Stop 6 is 42 street.
Stop 7 is 50 street.
Stop 8 is 59 street.
```

7. Write a Python graphics based program that requires the user to click on two points in its window, thereby defining a circle and one of its radii. The program then draws both the circle centered on the first point and the radius between the two points.

8. Trace the following Python code, i.e. indicate the state of the variables as they change and what output is printed to the screen:

(a)
```
f = 2
s = 4
for i in range(2,7)
    f, s = s, f + s
    print("f =", f, " s=", s)
```

(b)
```
n = 3
k = 1
for c in range(5):
    n = n + k
    k = c * k
    print("n =", n, " k = ", k)
```

9. Draw the output that would be displayed in the program's window if the following Python graphics based program were executed:

```
from graphics import *

def main():

    win = GraphWin("Picture", 400, 400)
    win.setCoords(0,0,100,100)

    left   = Point(10,50)
    right  = Point(90,50)
    bottom = Point(50,10)
    top    = Point(50,90)

    Line(left,top).draw(win)
    Line(top,right).draw(win)
    Line(right,bottom).draw(win)
    Line(bottom,left).draw(win)

    win.getMouse()
    win.close()

main()
```

10. Write a **complete** program that, using a loop, asks the user for the number and cost of 10 items. The program should then print out the total cost.