Lehman College, CUNY **CMP 230 Exam 1, Version 1** **Fall 2011**

1. Write Python code that prompts the user for the side of an isoceles right triangle, and prints out the area of the triangle. Useful formula: $area = \frac{side^2}{2}$.

2. What is the output of the following:

```
a = 3
b = a**2
c = b % 3
d = b // 2
print(a,b,c,d)
a,b = b,c
print(a,b,c,d)
a = b % 2
print(a,b,c,d)
c = b = a
print(a,b,c,d)
```

3. Write the following formulas in Python:

   (a) $\pi + \cos(\frac{x+y}{2})$

   (b) $l = |x_1 - x_2| + |y_1 - y_2|$

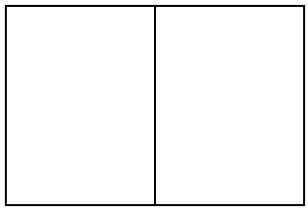
4. (a) What is the output of the following:

```
for i in [2,4,6,8,10]:
    print(i, ":", i**2)
```

   (b) What is the output of the following:

```
step = -2
end = 0
for j in range(10,end,step):
    print(j)
    print(end+step)
print("done")
```

5. Write a Python graphics-based program that will produce the following shape in a graphics window:



6. Write Python code that will:

   (a) Add the even numbers from 102 to 1002

   (b) Print the multiples of 4 from 40 to 100

7. Draw what would be displayed in the graphics window when the following program is executed:

```
from graphics import *
def main():
    win = GraphWin("What's displayed?")
    win.setCoords(0.0, 0.0, 10.0, 10.0)
    p1 = Point(5,2)
    p2 = Point(5,6)
    c1 = Circle(p1, 2)
    c2 = Circle(p2, 2)
    l = Line(p1,p2)
    c1.draw(win)
    c2.draw(win)
    l.draw(win)
    win.getMouse()
    win.close()
```

8. (a) What is the output of the following:

```
old = 1
older = 0
for i in range(1,6):
    n = old + older
    print(n)
    older = old
    old = n
```

(b) What is the output of the following:

```
total = 0
for i in range(10):
    total = total + ((-1)**i)*i
    print(total)
```

9. Write a **complete** graphics-based program that requires the user to click on two points in its window. The program then draws the axis aligned oval for which those two points are in opposing corners, along with a point at the center of the oval.

10. Write a **complete** program that, using a loop, asks the user for 20 numbers. The program should then print out the average of the first 10 numbers, followed by the product of the second 10 numbers.

Graphics Reference: (from p 108-111 of the textbook)

GraphWin Objects
GraphWin(title, width, height)
plot(x,y,color)
plotPixel(x,y,color)
setBackground(color)
close()
getMouse()
checkMouse()
setCoords(xll,yll,xur,yur)

Graphics Objects
setFill(color)
setOutline(color)
setWidth(pixels)
draw(aGraphWin)
undraw()
move(dx,dy)
clone()

Text Methods
Text(anchorPoint, string)
setText(string)
getText()
getAnchor()
setFace(family)
setSize(point)
setStyle(style)
setTextColor(color)

Point Methods
Point(x,y)
getX()
getY()

Line Methods
Line(point1, point2)
setArrow(string)
getCenter()
getP1(), getP2()

Circle Methods
Circle(centerPoint, radius)
getCenter()
getRadius()
getP1(), getP2()

Rectangle Methods
Rectangle(point1,point2)
getCenter()
getP1(), getP2()

Oval Methods
Oval(point1, point2)
getCenter()
getP1(), getP2()

Polygon Methods
Polygon(P1, P2, P3,...)
getPoints()

1. Write Python code that prompts the user for the area of an isoceles right triangle, and prints out the side of the triangle. Useful formula: $area = \frac{side^2}{2}$.

2. What is the output of the following:

```
x = 3
y = x**2
w = y % 3
z = y // 2
print(x,y,w,z)
x,w = w,z
print(x,y,w,z)
x = y % 2
print(x,y,w,z)
w = y = x
print(x,y,w,z)
```

3. Write the following formulas in Python:

   (a) $\frac{\pi}{4} + \cos(x - y)$

   (b) $r = \sqrt{\frac{a}{\pi}}$

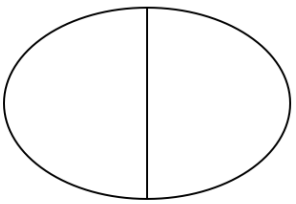
4. (a) What is the output of the following:

```
for i in [5,4,3,2,1]:
    print(i)
print("Blast off!")
```

   (b) What is the output of the following:

```
ans = 0
for j in range(1,10,2):
    ans = ans + j
    print(j)
print(ans)
```

5. Write a Python graphics-based program that will produce the following shape in a graphics window:



6. Write Python code that will:

   (a) Add the odd numbers from 1001 to 1111

   (b) Print the multiples of 5 from 50 to 500

7. Draw what would be displayed in the graphics window when the following program is executed:

```
from graphics import *
def main():
    win = GraphWin("What's displayed?")
    win.setCoords(0.0, 0.0, 10.0, 10.0)
    p1 = Point(2,2)
    p2 = Point(6,6)
    o = Oval(p1, p2)
    r = Rectangle(p1, p2)
    l = Line(p1,p2)
    o.draw(win)
    r.draw(win)
    l.draw(win)
    win.getMouse()
    win.close()
```

8. (a) What is the output of the following:

```
old = 1
older = 1
for i in range(2,7):
    n = old + older
    print(old)
    older = old
    old = n
```

(b) What is the output of the following:

```
total = 0
s = 1
for i in range(10):
    s = -s
    total = total + s*i
    print(total)
```

9. Write a **complete** graphics-based program that requires the user to click on two points in its window. The program then draws a circle of radius 10 at each click and draws a line that connects the points clicked.

10. Write a **complete** program that, using a loop, asks the user for 20 numbers. The program should then print out the sum of the first 10 numbers, followed by the product of the second 10 numbers.

Graphics Reference: (from p 108-111 of the textbook)

GraphWin Objects
GraphWin(title, width, height)
plot(x,y,color)
plotPixel(x,y,color)
setBackground(color)
close()
getMouse()
checkMouse()
setCoords(xll,yll,xur,yur)

Graphics Objects
setFill(color)
setOutline(color)
setWidth(pixels)
draw(aGraphWin)
undraw()
move(dx,dy)
clone()

Text Methods
Text(anchorPoint, string)
setText(string)
getText()
getAnchor()
setFace(family)
setSize(point)
setStyle(style)
setTextColor(color)

Point Methods
Point(x,y)
getX()
getY()

Line Methods
Line(point1, point2)
setArrow(string)
getCenter()
getP1(), getP2()

Circle Methods
Circle(centerPoint, radius)
getCenter()
getRadius()
getP1(), getP2()

Rectangle Methods
Rectangle(point1,point2)
getCenter()
getP1(), getP2()

Oval Methods
Oval(point1, point2)
getCenter()
getP1(), getP2()

Polygon Methods
Polygon(P1, P2, P3,...)
getPoints()

1. Write Python code that prompts the user for the side of an isoceles right triangle, and prints out the hypotenuse of the triangle. Useful formula: $hypotenuse^2 = 2side^2$.

2. What is the output of the following:

```
a = 10
b = a % 4
c = b**3
d = c // 2
print(a,b,c,d)
a,b = b,c
print(a,b,c,d)
a = b / 2
print(a,b,c,d)
c = b = a
print(a,b,c,d)
```

3. Write the following formulas in Python:

   (a) $\sin(\frac{x}{2})$

   (b) $l = \sqrt{(x_1 - x_2)^3 + (y_1 - y_2)^3}$

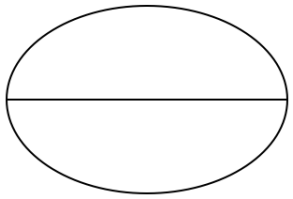
4. (a) What is the output of the following:

```
for z in [3,1,4,5,9]:
   print("I'm number", z)
```

   (b) What is the output of the following:

```
ans = 0
for j in range(5,0,-1):
    ans = ans + j
    print(j)
print(ans)
```

5. Write a Python graphics-based program that will produce the following shape in a graphics window:



6. Write Python code that will:

   (a) Add the odd numbers from 99 to 999

   (b) Print the multiples of 6 from 66 to 600

7. Draw what would be displayed in the graphics window when the following program is executed:

```
from graphics import *
    win = GraphWin("What's displayed?")
    win.setCoords(0.0, 0.0, 10.0, 10.0)
    p1 = Point(5,2)
    p2 = Point(5,5)
    p3 = Point(5,8)
    c1 = Circle(p1,2)
    c2 = Circle(p2,1)
    c3 = Circle(p3,2)
    c1.draw(win)
    c2.draw(win)
    c3.draw(win)
    win.getMouse()
    win.close()
```

8. (a) What is the output of the following:

```
old = 2
older = 3
for i in range(3,9):
    n = old + older
    print(old)
    older = old
    old = n
```

(b) What is the output of the following:

```
total = 0
s = 1
for i in range(0,-5,-1):
    s = -s
    total = total + i
    print(total)
```

9. Write a **complete** graphics-based program that requires the user to click on four points in its window. The program then draws lines between subsequent points clicked (that is, a line between the first and second points, a line between the second and third points, and a line between the third and fourth points).

10. Write a **complete** program that, using a loop, asks the user for 20 numbers. The program should then print out the total of the first 10 numbers, followed by the total of the second 10 numbers.

Graphics Reference: (from p 108-111 of the textbook)

GraphWin Objects
GraphWin(title, width, height)
plot(x,y,color)
plotPixel(x,y,color)
setBackground(color)
close()
getMouse()
checkMouse()
setCoords(xll,yll,xur,yur)

Graphics Objects
setFill(color)
setOutline(color)
setWidth(pixels)
draw(aGraphWin)
undraw()
move(dx,dy)
clone()

Text Methods
Text(anchorPoint, string)
setText(string)
getText()
getAnchor()
setFace(family)
setSize(point)
setStyle(style)
setTextColor(color)

Point Methods
Point(x,y)
getX()
getY()

Line Methods
Line(point1, point2)
setArrow(string)
getCenter()
getP1(), getP2()

Circle Methods
Circle(centerPoint, radius)
getCenter()
getRadius()
getP1(), getP2()

Rectangle Methods
Rectangle(point1,point2)
getCenter()
getP1(), getP2()

Oval Methods
Oval(point1, point2)
getCenter()
getP1(), getP2()

Polygon Methods
Polygon(P1, P2, P3,...)
getPoints()

1. Write Python code that prompts the user for the hypotenuse of an isoceles right triangle, and prints out the side of the triangle. Useful formula: $hypotenuse^2 = 2side^2$.

2. What is the output of the following:

```
x = 10
y = x % 4
w = y**3
z = w // 2
print(x,y,w,z)
x,y = y,w
print(x,y,w,z)
x = y / 2
print(x,y,w,z)
w = y = x
print(x,y,w,z)
```

3. Write the following formulas in Python:

   (a) $\frac{\sqrt{2}\pi}{2} + \tan(x)$

   (b) $v = \frac{4}{3}\pi r^3$

4. (a) What is the output of the following:

```
for i in [1,3,5,7,9]:
    print(i, i+1)
```

   (b) What is the output of the following:

```
ans = 0
for j in range(200,0,-50):
    ans = ans + j
    print(j)
print(ans)
```

5. Write a Python graphics-based program that will produce the following shape in a graphics window:

6. Write Python code that will:

   (a) Add the even numbers from 2012 to 4000

   (b) Print the multiples of 7 from 49 to 770

7. Draw what would be displayed in the graphics window when the following program is executed:

```
from graphics import *
def main():
    win = GraphWin("What's displayed?")
    win.setCoords(0.0, 0.0, 10.0, 10.0)
    p1 = Point(3,3)
    p2 = Point(7,7)
    c1 = Circle(p1,2)
    c2 = Circle(p2,2)
    l  = Line(p1,p2)
    c1.draw(win)
    c2.draw(win)
    l.draw(win)
    win.getMouse()
    win.close()
```

8. (a) What is the output of the following:

```
old = 1
older = 3
for i in range(0,5):
    n = old + older
    print(old)
    older = old
    old = n
```

(b) What is the output of the following:

```
total = 0
s = 1
for i in range(0,10,2):
    s = -s
    total = total + i
    print(total)
```

9. Write a **complete** 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 points at all four corners of the rectangle.

10. Write a **complete** program that, using a loop, asks the user for 20 numbers. The program should then print out the average of the first 10 numbers, followed by the average of the second 10 numbers.

Graphics Reference: (from p 108-111 of the textbook)

GraphWin Objects
GraphWin(title, width, height)
plot(x,y,color)
plotPixel(x,y,color)
setBackground(color)
close()
getMouse()
checkMouse()
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Point Methods
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getX()
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Line Methods
Line(point1, point2)
setArrow(string)
getCenter()
getP1(), getP2()

Circle Methods
Circle(centerPoint, radius)
getCenter()
getRadius()
getP1(), getP2()

Rectangle Methods
Rectangle(point1,point2)
getCenter()
getP1(), getP2()

Oval Methods
Oval(point1, point2)
getCenter()
getP1(), getP2()

Polygon Methods
Polygon(P1, P2, P3,...)
getPoints()