

CS177 Spring 2015  
**Final exam**  
Fri 05/08 7:00p - 9:00p

- There are 40 multiple choice questions. Each one is worth 2.5 points.
- Answer the questions on the bubble sheet given to you.
- Only the answers on the bubble sheet will be counted.
- The questions will be discarded.
- Programmable calculators cannot be used.
- This exam contains 29 pages (including this cover page)

Remember to fill in the following bubble card fields:

- Student ID: Use the 10 digit ID number on your student ID card. Do not use your social security number.
- Last Name and First Name
- Test/Quiz: 03, Course: 177
- Instructor: Your recitation TA's last name. Find it in the table below:
- Section number: Your recitation section number. Find it in the table below:

Recitation	Time	TA	Recitation Section Number
R01	Thursday, 07:30 am-08:20 am	Rohit Bhatia	0001
R02	Thursday, 09:30 am-10:20 am	Ruby Tahboub	0002
R03	Friday, 07:30 am-08:20 am	Ajay M S	0003
R04	Friday, 10:30 am-11:20 am	Haining Chen	0004
R05	Friday, 12:30 pm-01:20 pm	Rohit Bhatia	0005
R06	Friday, 02:30 pm-03:20 pm	Adib Rastegarnia	0006
R07	Friday, 04:30 pm-05:20 pm	Sait Celebi	0007
Y01	Distance learning	Wei Chuang	0008

**Recitation Section Number:** \_\_\_\_\_

**Student Last Name:** \_\_\_\_\_

**Student First Name:** \_\_\_\_\_

1. Which of the following statements creates a 4x3 matrix full of 1's?

- A. `matrix = 4*[1]*3`
- B. `[1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]`
- C. `matrix = [[1]*4 for i in range(3)]`
- D. `matrix = [1, 1, 1, 1]*3`
- E. `matrix = [[1]*3 for i in range(4)]`**

2. Which of the following options is true for the following Python program?

```
chr(ord('A')+2) == 'C'
```

```
s = "Hello World!"  
n = s.find("o")  
print (n)  
s[n] = "z"  
print (s)
```

- A. It prints 4 6  
HellzWzrld
- B. It prints 4  
HellzWzrld
- C. It prints 4  
HellzWorld
- D. It prints 6  
HelloWzrld
- E. Has TypeError**

3. What is the output of the following Python program?

```
l1 = [1, 2, 2, 3, 3, 3, 4, 4, 4, 4] * 4
l1 = l1[0:15]

l2 = [ l1.count(1), l1.count(2), l1.count(3), l1.count(4) ]

print(l2)
```

- A. [0, 0, 0, 0]
- B. [2, 3, 4, 4]
- C. [2, 3, 4, 5]
- D. [2, 4, 5, 4]**
- E. [2, 4, 5, 8]

4. What is the output of the following Python program?

```
myList = list(range(8)) + list(range(2,4)) + list(range(4,8))

myList = myList[2:-2]
myList = myList[3:-3]

myList.reverse()

print(myList)
```

- A. [2, 7, 6, 5]**
- B. [5, 2, 8, 4]
- C. [3, 2, 4, 9]
- D. [1, 2, 3, 4, 5]
- E. [2, 7, 6, 5, 8]

5. Which of the following programs use recursion?

I.

```
def addListElements(list):  
    if len(list)==0:  
        return 0  
    return list[0]+addListElements(list[1:])
```

II.

```
def addListElements(list):  
    count=0  
    for elem in list:  
        count+=elem  
    return count
```

III.

```
def fibonacci(n):  
    if (n==1 or n==2):  
        return 1  
    return fibonacci(n-1)+fibonacci(n-2)
```

IV.

```
def fibonacci(n):  
    fibs = [0,1,1]  
    for i in range(2,n):  
        fibs.append(fibs[i]+fibs[i-1])  
    return fibs[n]
```

A. I

B. I, II and III

C. I and IV

**D. I and III**

E. I and III and IV

6. What is the output of the following Python program?

```
def Collatz(n):  
    v = []  
    while n > 1:  
        if n % 2 == 0 :  
            n = int(n / 2)  
        else:  
            n = n * 3 + 1  
        v.append(n)  
    print( len(v) )
```

Collatz(5)

- A. 3
  - B. 4
  - C. 5**
  - D. 6
  - E. The code has an infinite loop
7. What is the time complexity of linear search and binary search, respectively?
- A.  $O(n)$ ,  $O(n)$
  - B.  $O(n)$ ,  $O(1)$
  - C.  $O(1)$ ,  $O(\log(n))$
  - D.  $O(n)$ ,  $O(\log(n))$**
  - E.  $O(\log(n))$ ,  $O(\log(n))$

8. What is the output of the following program

```
def lucasNumbers(n):  
    if (n==0):  
        return 2  
    if (n==1):  
        return 1  
    return lucasNumbers(n-1) + lucasNumbers(n-2)  
  
print(lucasNumbers(5))
```

- A. 5
- B. 7
- C. 8
- D. 11**
- E. 18

9. What is the space complexity of this algorithm that reverses a List (input is a list of length  $n$ )

```
def reverse(list1):  
    newlist = []  
    for i in range(-1, -len(list1) - 1, -1):  
        newlist.append(list1[i])  
    return newlist
```

- A.  $O(1)$
- B.  $O(\log(n))$
- C.  $O(n)$**
- D.  $O(n \cdot \log(n))$
- E.  $O(n^2)$

10. .... is a variable that is shared by all instances of a class?
- A. Object Variable
  - B. Class Variable**
  - C. Data Variable
  - D. Instance Variable
  - E. None of the Above
11. Which of the following provides a single interface to entities of different types?
- A. Encapsulation
  - B. Inheritance
  - C. Multiple Inheritance
  - D. Polymorphism**
  - E. Instantiation
12. What is the output of the following Python program?
- ```
s = "04/16/2015"  
d = s.split("/")  
s2 = d[1] + "/" + d[0] + "/" + d[2]  
print(s2)
```
- A. 16/04/2015**
  - B. 04/16/2015
  - C. 2015/04/16
  - D. 2015/16/04
  - E. 16/2015/04

13. Which of the following Python features is/are used in the following code?

```
class B:
    def __init__(self):
        self.i = 0

    def seti(self, x):
        self.i = x

    def geti(self):
        return self.i

    def p(self):
        return "From B"

class D(B):
    def __init__(self):
        B.__init__(self)
        self.j = 0

    def setj(self, y):
        self.j = y

    def getj(self):
        return self.j

    def p(self):
        return "From D"
```

- A. Encapsulation
- B. Inheritance
- C. Polymorphism
- D. Inheritance and Polymorphism
- E. Encapsulation, Inheritance and Polymorphism**



14. What is the output of the following Python program?

```
class A:
    def __init__(self, i):
        self.i = i

    def m1(self):
        self.i += 1

class B(A):
    def __init__(self, j):
        A.__init__(self, 3)
        self.j = j

    def m1(self):
        A.m1(self)
        self.j += 1

def main():
    b = B(0)
    b.m1()
    print(b.i, b.j)
```

main()

A. 0 0

**B. 4 1**

C. 3 1

D. 3 0

E. Error

15. What is the output of the following Python program?

```
class B:
    def __init__(self, name):
        self.name = name

    def get(self):
        return "Person's get is called"

    def printB(self):
        print(self.get())

class D(B):
    def get(self):
        return "Student's get is called"

def main():
    b = B("p1")
    d = D("s1")
    b.printB()
    d.printB()
```

main()

- A. Person's get is called  
Person's get is called
- B. Person's get is called  
Student's get is called**
- C. Student's get is called  
Person's get is called
- D. Student's get is called  
Student's get is called
- E. Error

16. .... is a variable that is defined inside a method and belongs only to a current instance of a class?
- A. Private Variable
  - B. Class Variable
  - C. Data Variable
  - D. Instance Variable**
  - E. None of the Above

17. What is the output of the following Python program if user enters 3?

```
num = input("Please input a number")
n2 = int(num)
y = num * 3
z = n2 * 5
print(y, z)
```

- A. 333 33333
- B. 9 15
- C. 9 33333
- D. 333 15**
- E. 3 \* 3 15

18. What is the output of the following Python program?

```
x = ord('A') + 2
print(x)
```

- A. A2
- B. C
- C. 67**
- D. TypeError
- E. AA

19. What is the output of the following Python program?

```
def func(a):
    b = a[:]
    b[0] = 0
    c = a
    c[2] = 4
    print(b)
```

```
a = [1, 2, 3]
func(a)
print(a)
```

- A. [0, 2, 3]  
[1, 2, 3]
- B. [0, 2, 4]  
[1, 2, 3]
- C. [0, 2, 3]  
[1, 2, 4]**
- D. [0, 2, 3]  
[0, 2, 3]
- E. [0, 2, 4]  
[0, 2, 4]

20. What is the output of the following Python program?

```
x = [1, 2, 3]
y = x * 2
z = y + x
print (z)
```

- A. 18
- B. [3, 6, 9]
- C. [2, 4, 6, 1, 2, 3]
- D. [1, 2, 3, 1, 2, 3, 1, 2, 3]**
- E. [[1, 2, 3], [1, 2, 3], 1, 2, 3]

21. What is the output of the following Python program?

```
s = "abcdef"
s2 = s[1:8:3] + s[:2] + s[5:]
print (s2)
```

- A. adaef
- B. babf
- C. becddefabcde
- D. beaceef
- E. beabf**

22. Given the contents of the file `cities.txt`:

```
Tokyo
Moscow
Lagos
London
```

What would the file `output.txt` be after the following Python program is executed?

```
f = open("cities.txt", "r")
f2 = open("output.txt", "w")
for i in range(4):
    line = f.readline()
    print( line[:-1], file=f2)
```

- A. Tokyo  
Moscow  
Lagos  
London
- B. TokyoMoscowLagosLondon
- C. Tokyo Moscow Lagos London
- D. The file is empty**
- E. Toky  
Mosco  
Lago  
Londo

23. What is the output of the following Python program?

```
def func():
    A = [[15]*5 for i in range(9)]
    B = [["Burger"]*2 for i in range(len(A)*2)]
    C = [["IceCream"*3] for i in range(len(A)+len(B))]
    print(len(A) + len(B) + len(C))
func()
```

- A. 54
- B. 90
- C. 180
- D. 675
- E. None of the above

24. What is the output of the following Python program?

```
def updateList(list):
    for i in range(len(list)-1, -1, -1):
        if list[i] > 5:
            list.pop(i)

def func():
    A = [1, 20, 4, 5, 12, 12, 25, 2, 90]
    updateList(A)
    print(A)

func()
```

- A. [1, 4, 2]
- B. [1, 4, 5, 2]
- C. [1, 4, 5, 12, 2]
- D. [1, 20, 4, 5, 12, 12, 25, 2, 90]
- E. Error

25. What is the output of the following Python program?

```
def func(A, B, C):
    D = []
    for item in A:
        if item in B:
            D.append(item)
    E = []
    for item in C:
        if item in D:
            continue
        E.append(item)
    return E
```

```
A = [1, 3, 2, 7, 10, 4, 3]
B = [2, 3, 5, 7, 18, 20]
C = [7, 99, 22, 5, 3]
result = func(A, B, C)
print(result)
```

- A. [3, 2, 7, 3]
- B. [1, 10, 4]
- C. [5, 18, 20]
- D. [7, 99, 22, 5, 3]
- E. [99, 22, 5]**

26. What is the output of the following Python program?

```
a = True
b = False
c = True
x = (a or b) and not (a and b)
y = (a and (not c)) or ((not a) and c)
print(x, y)
```

- A. False False
- B. False True
- C. True False**
- D. True True
- E. None of the above



27. What is the output of the following Python program?

```
def func (a, b, c):  
    if a > b and c < a:  
        return a  
    elif a <= b and c >= a:  
        return 2*a  
    elif a > b:  
        return c  
    elif c < a:  
        return b  
print(func(4, 5, 3))
```

- A. 3
- B. 4
- C. 5**
- D. 8
- E. 10

28. What is the output of the following Python program?

```
def func(n):  
    A = [[20, [30, 40], 50], ['w', 'x', 'y', 'z'], [[3, 4], 1,  
        'end'], ['I', 'Love', 'Purdue', ['Oh', 'YEAH']]]  
    for item in A:  
        if len(item) == n:  
            for x in item:  
                print(x, end=" ")  
func(4)
```

- A. 20 [30, 40] 50 w x y z [3, 4] 1 end
- B. 20 [30, 40] 50 w x y z I Love Purdue ['Oh', 'YEAH']
- C. w x y z [3, 4] 1 end
- D. w x y z [3, 4] 1 end I Love Purdue ['Oh', 'YEAH']
- E. w x y z I Love Purdue ['Oh', 'YEAH']**

29. What is the output of the following Python program?

```
myList1 = list(range(6)) * 2
myList2 = list(range(5,8)) * 2
mySet = set(myList1) - set(myList2)
print(mySet)
```

- A. {0, 1, 2, 3, 4}
- B. {1, 2, 3, 4}
- C. {0, 2, 4, 6}
- D. [0, 2, 5, 7]
- E. [0, 2, 6, 8]

30. What is the output of the following Python program?

```
myDict1 = {}
myDict2 = {}

for i in range(10):
    myDict1[i] = i*3 + 2
    myDict2[i] = i*4 - 1

temp = 0

for j in range(4,7):
    temp += myDict1[j] + myDict2[j]

print(temp)
```

- A. 62
- B. 80
- C. 104
- D. 108
- E. 120

31. What is the output of the following Python program?

```
def isPrime(x):  
    for i in range(2,x):  
        if x % i == 0:  
            return False  
    return True
```

```
temp = 0  
for i in range(2,8):  
    if i % 3 == 0:  
        temp += i ** 2  
    elif isPrime(i):  
        temp += i * 2  
    else:  
        temp += i
```

```
print(temp)
```

- A. 61
- B. 66
- C. 77**
- D. 79
- E. 82

32. Which of the following is correct about Project-4 (K-Nearest-Neighbor Classifier Project)?

- A. We have written all the program into one .py file and did not use any import statement.
- B. We followed an Object Oriented Programming approach to solve the problem.
- C.  $k = 0$  is a valid input
- D. If we have 5 blue points and 100 red points in the training set and use  $k=11$ , all new points will be classified as red.**
- E. If we have 6 blue points and 100 red points in the training set and use  $k=11$ , all new points will be classified as red.

33. What is the output of the following Python program? (Project-2, Caesar Cipher Project)

```
temp = "PURDUE"  
result1 = caesarEncipher(temp, 5)  
result2 = caesarDecipher(result1, 5)  
print(temp)  
print(result1)  
print(result2)
```

- A. UZWIZJ  
PURDUE  
UZWIZJ
- B. PURDUE  
UKZIWJ  
PURDUE
- C. PURDUE  
UZWIZJ  
PURDUE**
- D. PURDUE  
UZKSJI  
KUJKMI
- E. PURDUE  
MUKZJI  
BESIKT

English Alphabet: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

34. We store the fruits and the names of people who ate fruits in the following list format: `[[name_1, fruit_1], [name_2, fruit_2], ..., [name_N, fruit_N]]`. This means `name_1` ate `fruit_1`, `name_2` ate `fruit_2`, etc.. How to find the names of people who ate more than one different fruit?

```
myList = [ [ 'Sait', 'Apple' ],
            [ 'Ruby', 'Strawberry' ],
            [ 'Matthew', 'Banana' ],
            [ 'Adib', 'Orange' ],
            [ 'Sait', 'Peach' ],
            [ 'Steve', 'Cranberry' ],
            [ 'Matthew', 'Kiwi' ],
            [ 'Steve', 'Cranberry' ] ]
```

Qualifying names should be: Sait and Matthew (Order is not important in the result.)

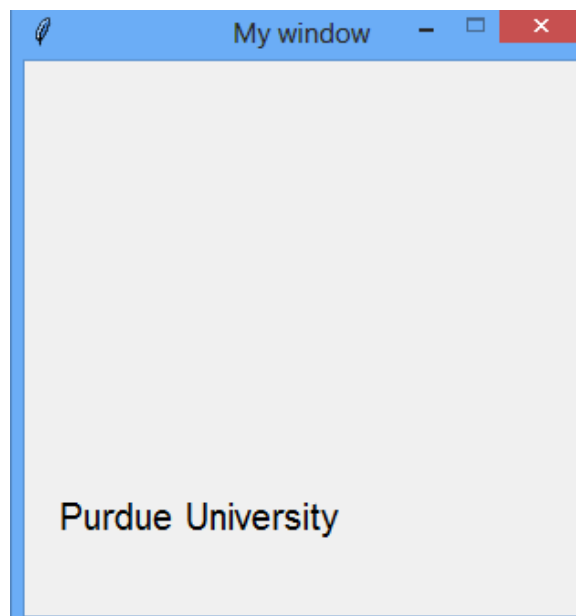
- A. `temp = []`  
`for item in myList:`  
    `temp.append(item[1])`  
    `if temp.count( item[1] ) == 2:`  
        `print(item[0])`
- B. `temp = []`  
`for item in myList:`  
    `temp.append( item[0] )`  
    `if temp.count( item[0] ) == 2:`  
        `print(item[0])`
- C. `temp = set()`  
`for item in myList:`  
    `temp.add(item[0])`  
    `if item[1] in temp:`  
        `print(item[0])`
- D. `temp = {}`  
`for item in myList:`  
    `if item[0] not in temp:`  
        `temp[ item[0] ] = set()`  
    `temp[ item[0] ].add( item[1] )`  
    `if len(temp[ item[0] ]) == 2:`  
        `print( item[0] )`
- E. `temp = {}`  
`for item in myList:`  
    `if item[0] not in temp:`  
        `temp[ item[0] ] = set()`  
    `temp[ item[0] ].add( item[1] )`

```
if len(temp[ item[1] ]) == 2:  
    print( item[1] )
```

35. Consider the following Python program:

```
from graphics import *  
def main():  
    win = GraphWin( 'My window' ,300 ,300)  
    ?  
    text = ?  
    text2 = ?  
    text2.setSize(15)  
    text.setSize(15)  
    text.draw(win)  
    text2.draw(win)  
main()
```

What should be at ?, text, text2 in order to get the following output?



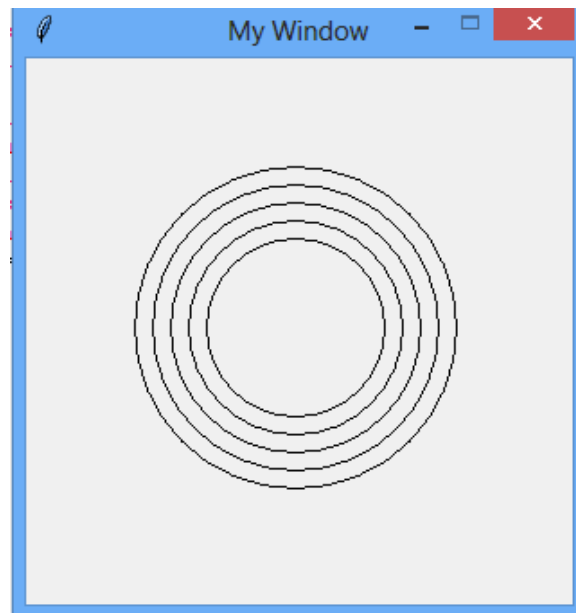
- A. `win.setCoords(0,0,300,300)`  
`text = Text(Point(50, 50), 'Purdue')`  
`text2 = Text(Point(130, 50), 'University')`
- B. `win.setCoords(300,300,0,0)`  
`text = Text(Point(50, 50), 'Purdue')`  
`text2 = Text(Point(130, 50), 'University')`
- C. `win.setCoords(300,300,0,0)`  
`text = Text(Point(50, 50), 'Purdue')`  
`text2 = Text(Point(50, 130), 'University')`
- D. `win.setCoords(0,0,300,300)`  
`text = Text(Point(50, 50), 'Purdue')`  
`text2 = Text(Point(50, 130), 'University')`
- E. `win.setCoords(0,0,300,300)`  
`text = Text(Point(130, 50), 'Purdue')`  
`text2 = Text(Point(50, 50), 'University')`

36. Consider the following Python program:

```
from graphics import *  
def main():  
    win = GraphWin( 'My Window', 300, 300)  
    win.setCoords(0, 0, 300, 300)  
    for i in range(50, 100, 10):  
        ?  
        cir.draw(win)  
    win.getMouse()
```

main()

What should be at ? in order to get the following output?



- A. `cir = Circle(Point(150, 150), i)`
- B. `cir = Circle(Point(50, 50), i)`
- C. `cir = Circle(Point(250, 250), i)`
- D. `cir = Circle(Point(0, 0), i)`
- E. `cir = Circle(Point(300, 0), i)`



37. What is the output of the following Python program?

```
from graphics import *
def main():
    win = GraphWin('My Window', 300, 300)
    win.setCoords(0, 0, 300, 300)
    line = Line(Point(50, 100), Point(150, 200))
    x = line.getP1().getX()
    y = line.getP2().getY()
    print(x, y)
    win.getMouse()
```

main()

- A. 50 100
- B. 50 200**
- C. 50 150
- D. 150 200
- E. 100 150

38. What is the output of the following Python program?

```
from graphics import *
def main():
    win = GraphWin('My Window', 300, 300)
    win.setCoords(0, 0, 300, 300)
    rect = Rectangle(Point(50, 100), Point(150, 200))
    x = rect.getX()
    y = rect.getY()
    print(x, y)
    win.getMouse()
```

main()

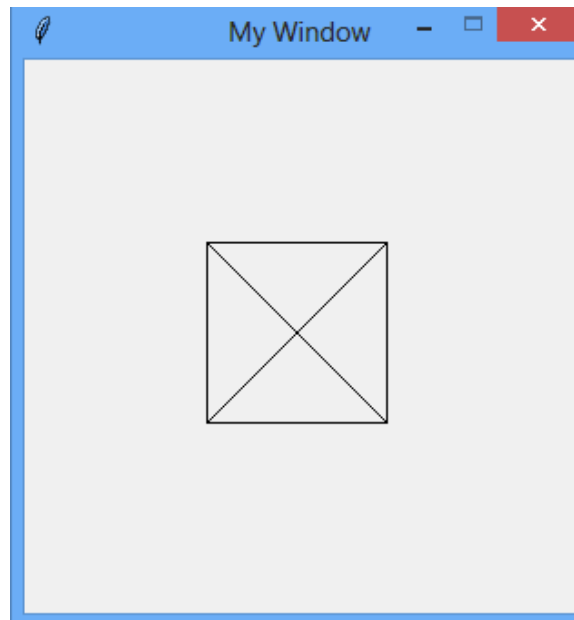
- A. 50 100
- B. 50 200
- C. 50 150
- D. 150 200
- E. AttributeError: 'Rectangle' object has no attribute 'getX'**

39. Consider the following Python program:

```
from graphics import *
def main():
    win = GraphWin('My Window', 300, 300)
    win.setCoords(0, 0, 300, 300)
    rect = Rectangle(Point(100, 100), Point(200, 200))
    x1 = rect.getP1().getX()
    y1 = rect.getP1().getY()
    x2 = rect.getP2().getX()
    y2 = rect.getP2().getY()
    line1 = ?
    line2 = ?
    rect.draw(win)
    line1.draw(win)
    line2.draw(win)
    win.getMouse()
```

main()

What should be at *line1* and *line2* in order to get the following output?



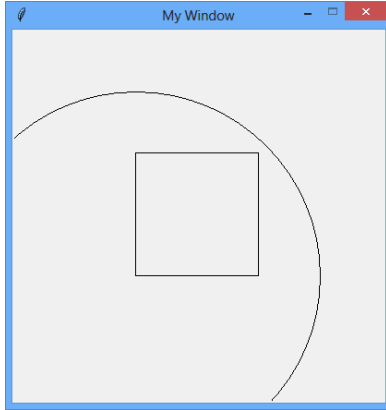
- A.      `line1 = Line(Point(x1, y1), Point(x2, y2))`  
          `line2 = Line(Point(x1 + 100, y1), Point(x1 + 100, y1))`
- B.      **`line1 = Line(Point(x1, y1), Point(x2, y2))`**  
          **`line2 = Line(Point(x1, y1 + 100), Point(x1 + 100,`  
                  `y1))`**
- C.      `line1 = Line(Point(x1, y1), Point(x2, y2))`  
          `line2 = Line(Point(x1 + 100, y1), Point(x2 + 100, y2))`
- D.      `line1 = Line(Point(x1, y1), Point(x2, y2))`  
          `line2 = Line(Point(x1 + 100, y1), Point(x2, y2 + 100))`
- E.      `line1 = Line(Point(x1, y1), Point(x2, y2))`  
          `line2 = Line(Point(x2, y2 + 100), Point(x1 + 100, y1))`

40. What is the output of the following Python program?

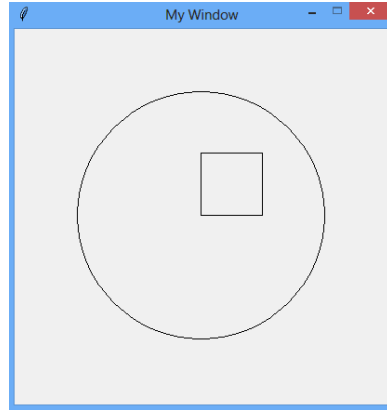
```
from graphics import *
def main():
    win = GraphWin('My Window', 400, 400)
    win.setCoords(0, 0, 300, 300)
    rect = Rectangle(Point(100, 100), Point(200, 200))
    x1 = rect.getP1().getX()
    y1 = rect.getP1().getY()
    cir = Circle(Point(x1, y1), 100)
    rect.draw(win)
    cir.draw(win)
    win.getMouse()

main()
```

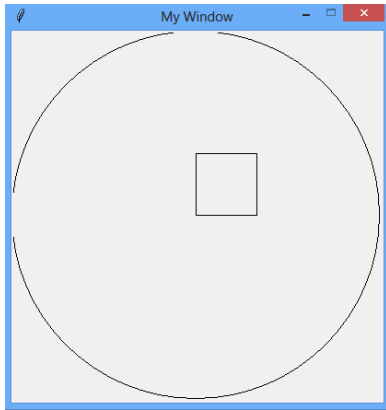
A.



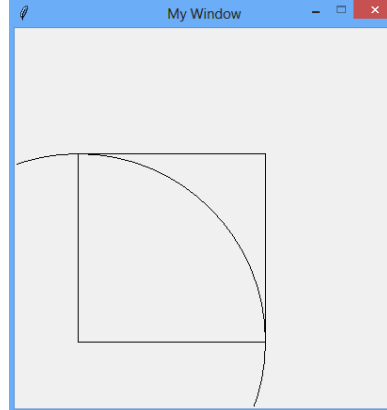
B.



C.



D.



E.

