1. (6 **marks**) Write a **recursive** function *highestLetter* that returns the highest letter (in alphabetical order) in a string *p*. For example, *highestLetter("banana")* should return `'n'`. You must not use any loops. The only built-in function that you may use is *len*.

```
def highestLetter(p):
    if len(p) == 0:
        return ''
    elif len(p) == 1:
        return p[0]
    else:
        m = highestLetter(p[1:])
        if p[0] > m:
            return p[0]
        else:
            return m
```

2. (6 **marks**) Write a function *removeMatches* that takes a word and a string of forbidden letters, and returns a string that is the original word with all forbidden letters removed. For example, *removeMatches("abracadabra","ace")* should return the string *"brdbr"*. Do not use the index operator `[]`. *Hint: employ the accumulator pattern.*

```
def removeMatches(word, forbidden):
    newStr = ""
    for ch in word:
      if ch not in forbidden:
        newStr = newStr + ch
    return newStr
```

3. (6 **marks**) Consider the following Python code. Line numbers are shown on the left.

```
 1   def pow(b, p):
 2       if p == 0:
 3           return 1
 4       y = pow(b, p-1)
 5       y = b * y
 6       return y
 7
 8   def square(x):
 9       a = pow(x, 2)
10       return a
11
12   n = 2
13   result = square(n)
14   print(result)
```

Write the sequence of the line numbers in the order in which they are processed in Python.

ANSWER: 1, 8, 12, 13, 9, 2, 4, 2, 4, 2, 3, 5, 6, 5, 6, 10, 14

4. (8 **marks**) Recall that in Assignment 2 you wrote code to compute simple statistics. Below is an incorrect program submitted as the solution to that question by Joe Careless. Mark all errors in the program, and for each error write the correct code on the right side in the same line. *Hint: there are no less than 8 errors in the program.*

```
numCases = int(input())                 #
case = 1                                # (remove)
for case in range(numCases+1):          # for case in range(numCases):
    numStudents = int(input())          #
    student = 0                         # (add: sum = 0)
    while student <= numStudents:       # while student < numStudents:
        maxScore = 0                    # (move before the loop)
        name = int(input())             # name = str(input())
        score = int(input())            #
        if score > maxScore:            #
            maxScore = score            #
            maxName = name              #
        sum = sum + score               #
        student = student + 1           #
    average = sum // numStudents        # average = sum / numStudents
    print("Case %d" %case)              #
    print("%.2f" %average)              #
    print("%.2f %s" %maxScore %maxName) # print("%.2f %s" %(maxScore, maxName))
```

5. (4 **marks**) What is the output of the following program?

```
for i in range(10):
   j = i // 2
   while j > 0:
      print(j, end=" ")
      j = j - 2
```

OUTPUT: 1 1 2 2 3 1 3 1 4 2 4 2

6. (8 **marks**) Short answers.

   (a) What is a *keyword* in Python? Give an example.

   A reserved word which has a predefined meaning in the language; e.g. **else**. Keywords can't be used as names for variables, methods, or other identifiers.

   (b) Translate the following *for* loop into a *while* loop that produces the same output:

```
for i in range(10):
    print(i)
```

```
i = 0
while i < 10:
    print(i)
    i = i + 1
```

   (c) What single statement can be executed in the body of a loop to cause it to terminate?

   break

   (d) Write a single statement that uses the slicing operator to extract a substring composed of the third and the fourth letters from a six-letter word w.

   `w[2:4]`

   (e) Write a single Boolean expression that is *True* if x is divisible by 3, and *False* otherwise.

   `x % 3 == 0`

   (f) What is the correct way to reference the value π within the math module?

   `math.pi`

   (g) What is the result of executing the following statement?

```
print("banana".find("a"))
```

```
1
```

   (h) What is the result of executing the following statement?

```
print("9"+"8" * 2)
```

```
988
```