Bonus Python Homework
Due at 12:59 pm May 9

You must work on the bonus assignment on your own. This is not a group homework. The maximum credit for this bonus homework is 8%. You can find a useful python tutorial at Catcourses. Please submit your python code and a README file to Catcourses.

1. Implement python functions for all logical operators:

1.1 AND (p and q)

```
def AND(p, q):
```

1.2 OR (p or q)

```
def OR(p, q):
```

1.3 IF (p -> q)

```
def IF(p, q):
```

1.4 NOT (-p)

```
def NOT(p):
```

1.5 IFF (p <-> q)

```
def IFF (p, q):
```

1.6 Give a prefix representation of a proposition, of the form prop = ('OR', True, False). Write a function named evaluation, which will evaluate the proposition. You should use the functions defined in questions 1.1-1.5

```
def evaluation(formula):
```

Test your evaluation function with the following:

```
print "Simple Evaluation Function Test"
print
p = True
q = False

print "p =", p
print "q =", q
```

```
print
print "(p or q):   ", evaluate (('OR', p, q))
print "(p and q):  ",evaluate (('AND', p, q))
print "(p -> q):   ",evaluate (('IF', p, q))
print "(p <-> q):  ",evaluate (('IFF', p, q))
print "-p:         ",evaluate (('NOT', p))
```

2. Develop the following python program.
Implement Cartesian production of two sets. For example,

x = [‘a’, ‘e’]
y = [1, 3, 7, 9]

3. Given two sorted lists, it is possible to merge them into one sorted lists in an efficient way. Design and implement a divide and conquer algorithm to merge two sorted lists.

```
def merge(list1, list2):

   # Provide your code here

print "merge([1, 3, 5, 7], [2, 4, 6, 8]):\t", merge([1, 3, 5, 7], [2, 4, 6, 8])

# should return [1, 2, 3, 4, 5, 6, 7, 8]
```

4. Implement Euclid's Algorithm for finding the greatest common divisor of two integers

```
def gcd(a, b):

   # Provide the correct implementation

   return b

print gcd(128, 60)

# Expected output: 4
```