6.00 Introduction to Computer Science and Programming
Fall 2008

Sample Quiz Questions

Here are some sample quiz questions. There are not intended to provide comprehensive coverage of the material covered thus far in 6.00. However, they should give you a sense of the kinds of questions that will be on the quiz.

This quiz is **open book and open notes, but do not use a computer**.

1) Are each of the following True or False:

1.1. Any program that can be written using only function definitions and calls, the basic arithmetic operators, assignment, and conditionals will run in constant time.

1.2. Newton's method will always converge on a correct root of a function.

1.3. In Python, dictionaries are immutable.

1.4. The value of `'math.sqrt(2.0)*math.sqrt(2.0) == 2.0'` is True.

1.5. One should always avoid iteration when a recursive solution is possible.

1.6. Typically, the use of functions in a program reduces the total number of lines of code.

1.7. In Python, retrieving the value associated with a dictionary key takes roughly constant time.

2) Consider the implementations of compare1 and compare 2, where `a` and `b` are floats.

2.1) Do compare1 and compare2 return the same value for all possible inputs? If not, give a pair of inputs for which they return a different value.

2.2) Do compare1 and compare2 print the same thing for all possible inputs? If not, give a pair of inputs for which they print different things.

```
def compare1(a, b):
   if a < 0:
      a = -a
   if b < 0:
      b = -b
   res = (a == b)
   if res:
      print a, 'and', b, 'have the same absolute value.'
   else:
      print a, 'and', b, 'have different absolute values.'
   return res
```

```
def absolute_value(n):
   if n < 0:
      n = -n
   return n

def compare2(a, b):
   res = absolute_value(a) == absolute_value(b)
   if res:
      print a, 'and', b, 'have the same absolute value.'
   else:
      print a, 'and', b, 'have different absolute values.'
   return res
```

3) Consider the following implementation of a function f, where x is a positive integer:

```
def f(x):
    xs = str(x)
    if len(xs) == 1:
        return int(xs)
    n = int(xs[0]) + int(xs[1])
    if len(xs) == 2:
        return n
    else:
        return n + f(xs[2:])
```

What does `f(2112)` return?

3.2. Write a specification of f.

4) Provide a Python implementation of a function `first_N` that takes a positive integer, `n`, as its only argument. The function should print the first `n` perfect squares that are **not** even numbers. E.g., if `n` were 2 it should print the perfect squares 1 and 9.

5. Write pseudo code for an exhaustive enumeration variant of guess and check.

6.) Provide a Python implementation for the function *findSide* specified below

```
def findSide():
    """asks the user to enter the area of a rectangle and the length of one side of the
rectangle.  Returns a floating point number that is the length of the adjacent side."""
```

7) Does the following function meet its specification? If not, change the program so that it is consistent with the specification.

```
def f(L):
    """Returns a copy of the list L without modifying L."""
    result = []
    for e in L: result.append(e)
    return result
```

Sample Quiz Questions

8) At McDonalds one can buy chicken nuggets in packages containing 6, 9 or 20 pieces. Write a Python function that accepts an integer, *num*, as an argument and decides whether or not it is possible to buy *num* nuggets at McDonalds.

9) Write an appropriate specification for the function below. Assume that n is an integer.

```
def f(n):
    s = str(n)
    if len(s) <= 1: return s
    return s[-1] + f(int(s[:-1]))
```