

Introduction to Computing Test 1

Question 1. (8 points) What is the role of the CPU/processor within a computer?

It fetches, decodes, and executed instructions of a program.

Question 2. (12 points) Indicate the resulting value **and type** (int, float, Boolean, long int) of evaluating each of the following expressions. For partial credit, list the order of operations.

a) $4.0 / 10.0 + 2.0 * 3$ Result: 6.4 Type: float
Order of operations: 1. 4.0 / 10.0 = 0.4; 2. 2.0 * 3 = 6.0; 3. 0.4 + 6.0 = 6.4

b) $11 \% 3 + 7 / 3$ Result: 4 Type: int
Order of operations: 1. 11 % 3 = 2; 2. 7 / 3 = 2; 3. 2 + 2 = 4

c) $(not(4.0 < 10.0)) or 5 > 1.2345$ Result: True Type: Boolean
Order of operations: 1. 4.0 < 10.0 = True; 2. not(True) = False; 3. 5 > 1.2345 = True; 4. False or True = True

Question 3. (10 points) Complete a simple program (without user-defined functions) that allows the user to enter the lengths of three sides of a triangle (a, b, c) and calculates the triangles area by the following formulas:

$$s = \frac{a+b+c}{2}$$

$$area = \sqrt{s(s-a)(s-b)(s-c)}$$

import math # From the math module use the math.sqrt() function

a = input("Enter side one: ")

b = input("Enter side two: ")

c = input("Enter side three: ")

s = (a+b+c) / 2.0

area = math.sqrt(s*(s-a)*(s-b)*(s-c))

print "The area is ", area

Question 4. (10 points) Consider running the following program three times with different inputs. Show the expected output for each of the inputs:

```
a = input( 'Enter a: ')
b = input( 'Enter b: ')
c = input( 'Enter c: ')
if a > b:
    print "Who?"
    if b > c:
        print "Up"
    else:
        print "Down"
elif b > c:
    print "What?"
    if a >= c:
        print "One"
    elif a < b:
        print "Two"
    elif c == b:
        print "Three"
else:
    print "Where?"
    if a == b:
        print "Dog"
    else:
        print "Cat"
print "Done"
```

a)

Expected Output if inputs are: a = 3, b = 4, and c = 5

Where?
Cat
Done

b)

Expected Output if inputs are: a = 5, b = 4, and c = 3

Who?
Up
Done

c)

Expected Output if inputs are: a = 3, b = 3, and c = 5

Where?
Dog
Done

Question 5. (10 points) What is a sentinel value and how is it used to control looping?

A sentinel is a special input value used to signal the end of data so the loop should terminate.

Question 6. (5 points) What decimal (base-10) value is represented by the binary number 011001₂? ¹⁶⁸⁴²¹

$$16 + 8 + 1 = 25_{10}$$

Question 7. (15 points) Consider the following program that takes as input a test score (0 to 100) and tries to determine the grade according to the standard 90-80-70-60 cutoffs.

```
testScore = input("Enter a test score: ")

if testScore >=90:
    grade = 'A'
if testScore >=80:
    grade = 'B'
if testScore >=70:
    grade = 'C'
if testScore >=60:
    grade = 'D'
else:
    grade = 'F'

print grade
```

a) Does this program work correctly (i.e., produces the correct grade)? (Justify your answer.)

No, since the if statements are not nested, the test score of 100 would be assigned a grade of 'D'.

b) How could you improve the above program? (Justify your answer)

make the 2nd, 3rd, and 4th "if"s "elif"s.
Thus, only one grade would be assigned.

Question 8. (15 points) Write a program to print a randomly generated string of 10 lower-case letters. (Recall that the `ord` function returns the ASCII value of a character, and the `chr` function returns the character given an ASCII value argument.)

```
randomString = ""
for count in xrange(10):
    randomString = randomString + chr(randint(ord('a'),
                                                ord('z')))
print randomString
```

Question 9. (15 points) Write a program that:

- allows the user to enter two integer numbers,
- calculates the sum of all integers between these numbers (the sum should not include the user-entered numbers themselves), and
- prints the sum in a meaningful statement.

A sample interaction would look like:

```
This program sums all the integers between two integers.
Enter the first integer: 3
Enter the second integer: 7
The sum of integers between 3 and 7 is 15.
```

```
print "This program sums all the integers between",
print "two integers."
```

```
number1 = input("Enter the first integer: ")
```

```
number2 = input("Enter the second integer: ")
```

```
if number1 > number2:
```

```
    temp = number1
```

```
    number1 = number2
```

```
    number2 = temp
```

```
sum = 0
```

```
for number in xrange(number1+1, number2):
    sum += number
```

```
print "The sum of integers between",
print number1, "and", number2, "is", sum, "."
```