

Introduction to Programming

Department of Computer Science and Information Systems

Lecturer: Steve Maybank

sjmaybank@dcs.bbk.ac.uk

Spring 2020

Revision of the Summer 2017 Examination



Question 1a

```
Which of the following are names of variables
_3y6
3y_6
Y3-6
___ # adjacent underscores
p08_
```



Rules for the Names of Variables

 The only characters allowed are numbers, letters and underscore

A name cannot begin with a number

Question 1b

- What are the final values of a, b, c, d, e?
- p = 3
- q = 2
- a = p+q*4
- b = 10**p**q
- c = 5*p-q/5
- d = 5-(4-(3-(2-p)))
- e = p%2+q%2



Operators and Precedence

Exponentiation: **

Times: * Real Division: / Remainder: %

Plus: + Minus: -

- Apply the highest precedence operator first:
- **25%2**3**
- If the operators have the same precedence then evaluate left to right:
- **25%3*8**



Question 2b

- A swimming pool with volume poolVolume litres is initially empty. Water enters at inSpeed litres/min, but leaks away at outSpeed litres/min. Find the number mFill of minutes required to fill the pool.
- (inSpeed outSpeed) *Mfill = poolVolume
- Note the camel case names



Volume of Water

- The volume entering the pool in one minute is (inSpeed-outSpeed)*1
- The volume entering the pool in mFill minutes is (inSpeed-outSpeed)*mFill
- The definition of mFill ensures that the last quantity is the pool volume.



- A train with an average speed of 100km per hour travels from L to B in 3 hours, but it has to wait at B.
 As a result, the average speed is reduced to 90km per hour. Find the waiting time.
- 90 = distance/totalTime
 - = distance/(journeyTime+waitingTime)
 - = 300/(3+waitingTime)
- waitingTime = 1/3 hours



Question 3

Find five errors in the code

```
import = 0  # import is a reserved word
if export > import :  # export not defined
  import = 3.0
  export = 3E-5
  print("import is"+3.0)  # string+number
else  # missing colon
  export = export//import # division by zero
```



Question 4

 Write code to show "Please enter the price:" in the shell and to return a value entered at the keyboard. The returned value is converted to floating point and assigned to a variable price.

price = float(input("Please enter the price:"))



Question 4, Second Part

 What is the value of price for each of these inputs in the shell

```
Please enter the price: 5 # 5.0
```

Please enter the price: "5" # error

Please enter the price: 6.2 #6.2

Please enter the price: 5*6.2 # error



Question 4, Part c (i)

What is printed when the following code is run?

```
print("He said\n\"Hello\" and 'Goodbye'\ntoday.")
```

```
"He ... today." # The quotes contain a string said\n # \n is new line \"Hello\" # \" is a character in a string \"Goodbye' # ' is a character in a string \"ntoday # \n is new line
```

Question 4, Part c (ii) and (iii)

What is printed when the following code is run? houseNumber = 32streetName = "Hamilton Road" print(houseNumber + streetName) print(len("\\"*3+"Harry")) "\\\" # string with the single character backslash # repeat the string three times # string concatenation +



Question 4, Part c (iv) and (v)

What is printed when the following code is run?

```
firstName = "Mickey"
lastName = "Mouse"
print(firstName[3], lastName[-3])

names = ["Amir", "Barry", "Chris", "Dylan"]
print(names[-1][-1])
```



Question 5a

What is printed? Use ~ to indicate a space

```
temperature = 39.8954
print("A:", "%d" % temperature)
A:~39 # %d implies integers
```

print("B:", "%.f" % temperature)
B:~40 # %.f implies floating point, no fraction

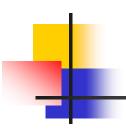


Question 5a Continued 1

What is printed? Use ~ to indicate a space

```
temperature = 39.8954
print("C:", "%s" % temperature)
C:~39.8954 # %s implies string
```

```
print("D:", "%06.2f" % temperature)
D:~039.90 # %06.2f implies a field width
# of 6, 2 decimal places and 0 padding
```



Question 5a Continued 2

What is printed? Use ~ to indicate a space

```
temperature = 39.8954

print("E:", "%-7d%%" % temperature)

E:~39~~~% # %-7d implies integer

# in a field of width 7 and left justified.

# %% implies a single character %
```



Question 5b

Write code to print the following using a multiple format specifier

Temperature: ~39.9 ~ C ~ ~ Feeling: ~ ~ ~ Great

st1 = "Temperature:~%4.1f~C~~Feeling:~%7s"

%4.1f implies a field of width 4 and 1 decimal place # %7s implies a string in a field of width 7 print(st1 % (temperature, "Great"))



Question 6a

- Explain how the lexicographic ordering for characters is extended to give a lexicographic ordering for strings
- Let a, c1, c2 be any strings. Let b1, b2 be distinct characters, i.e. strings of length 1.

$$st1 = a+b1+c1$$

$$st2 = a+b2+c2$$

If b1 < b2 then st1 < st2. If b1 > b2 then st1 > st2.



Question 6b

space < numbers < uppercase < lowercase</p>

True or False:

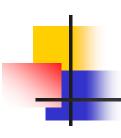
```
"1" < "2"

"cart" < "carp"

"milestone" < "mile stone"

"Corn" < "2Corn"

"car" < "care"
```



Question 7a

wind speed	description
s <= 1	calm
1 < s <= 3	light air
3 < s <= 7	light breeze
7 < s	out of range

 Write nested if statements to print the correct descriptions given a non-negative value of s. Use if ... elif ... else.



Question 7a Continued

wind speed	description
s <= 1	calm
1 < s <= 3	light air
3 < s <= 7	light breeze
7 < s	out of range

- if s<= 1:
- print("calm")
- elif s <= 3:</p>
- print("light air")
- elif s <= 7:</p>
- print("light breeze")
- else:
- print("out of range")



Question 8a

What is printed when the following code is run?

```
sumSquares = 0
for x in range(3):
    sumSquares = sumSquares+x*x
print(sumSquares)
```

x in range(3), so x takes the values 0, 1, 2



Question 8b

What is printed when the following code is run?

```
sumSquares = 0
for x in range(3):
    sumSquares = sumSquares+x*x
    print(sumSquares)
```

x in range(3), so x takes the values 0, 1, 2



Question 8c

Write code to input 6 numbers and then print out the position of the largest number.

```
large = float(input("Enter a number:"))
position = 1
for i in range(2, 7):
   x = float(input("Enter a number:"))
   if x > large:
      large = x
      position = i
print("position of largest no:", position)
```



Question 9a

 Identify in the following code the name of a variable, the name of a function and the values of the arguments to a function

```
quantity = 5*8
price = round(6.8275, 2)
```



Question 9c

describe the compile time error in the code.

```
def main():
  result = cubeVolume(2)
  print("side length 2, volume", result)
main()
def cubeVolume(sideLength):
  if (sideLength \leq 0):
     return 0
  return sideLength**3
```



Question 9d

Identify the branches in the function cubeVolume

```
def cubeVolume(sideLength):
    if (sideLength <= 0) :
       return 0
    volume = sideLength**3
    return volume</pre>
```



Question 10b

What is the length of the list scores? Which nonnegative integers can be indices to scores?

$$scores = [17, 5, 3]$$



Question 10c

Which number is printed by the following code?

```
scores = [17, 5, 3]
values = scores
scores[0] = 10
print(values[0])# two names but only one list of numbers
```