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SEMESTER 1, 2021 EXAMINATIONS

Physics, Mathematics & Computing

CITS1401**Computational Thinking with Python
Examination**

This paper contains: 10 Pages (including title page)

Time Allowed: **2:00** hours**INSTRUCTIONS:**

- This examination paper comprises of 1 section containing 8 questions.
- Attempt all questions and total marks are 100.
- Answer to all the questions are to be written in the spaces provided in this exam booklet.
- Use the blank pages in the start and at the end for rough work.
- No calculators or other aids are allowed.
- You must put your name and number on this page and any other booklet you use during the exam. All these must be handed in at the end of the exam.

Office use only.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

THIS IS A CLOSED BOOK EXAMINATION**SUPPLIED STATIONERY****ALLOWABLE ITEMS****PLEASE NOTE**

Examination candidates may only bring authorised materials into the examination room. If a supervisor finds, during the examination, that you have unauthorised material, in whatever form, in the vicinity of your desk or on your person, whether in the examination room or the toilets or en route to/from the toilets, the matter will be reported to the head of school and disciplinary action will normally be taken against you. This action may result in your being deprived of any credit for this examination or even, in some cases, for the whole unit. This will apply regardless of whether the material has been used at the time it is found.

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Library modules are not allowed to be imported for any of the question in this exam.

1. Define a Python function `stringexpand(name)` which, given a string `name`, returns the expanded string such that white space is added after each character of the input string. For example, `stringexpand("Adam")` returns "A d a m". **[5 Marks]**



2. Define a Python function `palindrome(word)`, which checks whether the input string is palindrome or not (irrespective of whether the alphabets are upper or lower case) and then returns boolean result accordingly. Palindrome string is the string which is same both backwards and forwards. For example, `palindrome("Racecar")` will return `True`. Similarly, `palindrome("dude")` will return `False`.

[5 Marks]



3. Define a Python function `sortdict(dict)` which, given a dictionary `dict` of student IDs and students WAM as keys and values respectively, returns the list of tuples sorted by student WAM in descending order. For example,
`sortdict({212222:35, 222222:85, 223222:55})` returns
`[(222222, 85), (223222, 55), (212222, 35)]`
Hint: Think about using `sort()` function with lists. **[10 Marks]**



4. [Use recursion to solve this problem]
Define a Python function `sumdigits(n)` which, given a positive integer, returns the sum of the digits of input `n`.
For example, `sumdigits(1234)` returns 10 (obtained by summing all the digits of input: $1+2+3+4=10$). **[10 Marks]**
Note: Recursion must be used to solve this question. Looping is not allowed.



5. Below mentioned is the Maclaurin series for the exponential function e^x . Summing higher number of terms provides better approximation.

$$\sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots = e^x$$

where "!" represents the factorial such as $1!=1, 2!=2 \times 1=2, 3!=3 \times 2 \times 1=6$ and so on.

Define a Python function `seriesexp(x,tol)` which, given numerical values `x` and `tol`, returns the sum of the above series for input `x` till the absolute value of the term becomes smaller than `tol`. For example, `seriesexp(1,0.1)` returns 2.66666 which is obtained by adding first four terms only because the absolute value of fifth term $1^4/4!$ becomes smaller than the input to the function 0.1 i.e. $(1/24)<0.1$

[15 Marks]



6. Write a Python function `multiply_lists(lst)` which can return the product of the numerical data in the input list `lst`. However, it is possible that the input list, `lst`, possibly contain other lists (which can be empty or further contain more lists). You can assume that the lists only contain numerical data and lists. For example, `multiply_lists([1,2,[],3.5,4])` returns 28.0; Similarly `multiply_lists([1,[2],[3.5,[4]])` also returns 28.0.

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[20 Marks]



7. Claremont cricket club has many players and needs to make combinations of three players for the practice sessions. There are three type of players: Batsman, bowler and wicket-keeper. All of them are in different pools and the club needs to select one player from each pool and make a combination. All players in each pool need to have practice session with all players of other pool.

Write a python function `team_maker(pool1,pool2,pool3)` for the above situation which, given three lists of pools of players (`pool1,pool2,pool3`) returns a list containing all different combinations for the practice sessions. Each item of the output list has the names of players combined as a string with a white space ' '.

For example,

```
team_maker(['Smith','Finch'], ['Cummins','Lyon'], ['Adam','Payne'])
```

returns ['Smith Cummins Adam', 'Smith Cummins Payne', 'Smith Lyon Adam', 'Smith Lyon Payne', 'Finch Cummins Adam', 'Finch Cummins Payne', 'Finch Lyon Adam', 'Finch Lyon Payne']

[15 Marks]



8. Write a Python function `user_account(filename)` which, given a file name reads the file, then extracts the users' first name, last name and date of birth, creates the login and passwords for the user and stores them in `logins.txt`. The file filename will be a text file in which each value is separated by a comma "," character - and each line of values is separated by a new line ("\n") at the end. Each extracted login and password is stored in `logins.txt` in such a way that the values are separated by a comma "," and each user data is stored in a separate line. The order of the user data is according to the title of the column, however the order of the titles is not known. Therefore, you must need to search the indexes of titles "First name", "Last name" and "Date of birth" and use these indexes in retrieving user's data.

The methodology for creating the login is by combining first and last name with a dot "." between them. The passwords are created by last name followed by a dollar sign "\$" which is followed by digits of date of birth.

For example, a file "userdata.txt" contains following five lines of text

```
s_no,First name,Middle name,Last name,Date of birth,Address,Phone
1, Ali,Kem,Khan,12/5/2000,Crawley WA,+43444444
2, John,Roger,Smith,1/12/1988,Perth City 6000,+61821021010
3, Sarah,Kimberly,Jones,22/8/1999,Subiaco WA,+61431312312
4, Huan,Jian,Li,5/8/2002,Claremont 6010 WA,+618323454
```

Running the function `user_account("userdata.txt")` creates the file `login.txt` having following contents.

```
Ali.Khan,Khan$1252000
John.Smith,Smith$1121988
Sarah.Jones,Jones$2281999
Huan.Li,Li$582002
```

[20 Marks]

Note: You need to ensure that function should terminate gracefully if there are any I/O errors



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