CSIS104 Introduction to Computer Science

Midterm Exam Model Answer

<div style="border:1px solid">

Bar code

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Instructions: Please Read Carefully Before Proceeding.

1. The allowed time for this exam is 2 hours (120 minutes).
2. Be sure to answer all questions.
3. Please write your solutions in the space provided. If you need more space, please use the back of the sheets.
4. This exam booklet contains 6 pages, including this page.

All the best.

Please, do not write anything on this area.

Question	1	2	3	4	Total
Maximum Mark	15	27	15	27	84
Earned Marks					

Question 1: **(15 marks)**

Write a Python program that gets as inputs the prescribed amount of liquid medication in mg and the concentration in mg/mL. The program should calculate and print the exact number of teaspoons.

Since it is not easy to handle small fractions of teaspoons, the algorithm should <u>also</u> print the dose approximated to the nearest half teaspoon.

Hints:
    1- One teaspoon is 5mL.
    2- You may wish to use a round( ) function or int( ) function, both are accepted as an answer for this question.
    3- Volume = Mass / Concentration

For example:
    Inputs:
      Prescribed amount in mg? 145
      Concentration in mg/mL? 20
    Output:
      The exact dose is 1.45 teaspoons.
      The approximated dose is 1.5 teaspoons.

Solution:

```
amount = eval(input("Enter the prescribed amount in mg:"))   2 marks
conc = eval(input("Enter the concentration in mg/mL:"))       2 marks
volume = amount / conc                                        1 mark
exact_dose = volume / 5                                       1 mark
half_spoons = exact_dose * 2                                  2 marks
approximated_half_spoons = round(half_spoons)                 1 mark
approximated_dose = approximated_half_spoons / 2              2 marks
print("The exact dose is ", exact_dose, " teaspoons.")        2 marks
print("The approximated dose is ", approximated_dose, " teaspoons.")2 marks
```

Question 2: (27 marks)

Write an algorithm that asks the doctor about the adult dose in mg and the age of the patient in months. If the patient is older than 12 years, the algorithm should print the full dose.

Otherwise, if the age is 12 years or less, the patient is considered a child and thus the algorithm should ask the doctor to enter the name of the child rule to use. Depending on the name of the rule, a child dose should be calculated and printed. The algorithm should ask for the weight of the patient in kilograms only if needed. The algorithm should print an error message if the input is not acceptable.

$$\text{Fried:} Child\ Dose = \frac{\text{Age in months}}{150} * Adult\ Dose$$

$$\text{Young:} Child\ Dose = Adult\ Dose * \left(\frac{\text{Age in years}}{\text{Age in years} + 12} \right)$$

$$\text{Clark:} Child\ Dose = \frac{\text{weight in lbs}}{150} * Adult\ Dose$$

Hint: 1Kg=2.2 lbs

Solution:

Solution :
adult_dose = eval(input("Enter the adult dose in mg:"))   2 marks
age_in_months = eval(input("Enter the age in months:"))   2 marks
if age_in_months > 12*12:   2 marks
      print("The dose is ", adult_dose, " mg")   2 marks
else:
          rule = input("Enter the name of the rule [Fried, Young, or Clark]:")   2 marks
          if rule == "Fried":   2 marks
                child_dose = adult_dose * age_in_months /150   1 mark
          elif rule == "Young":   2 marks
                age_in_years = age_in_months / 12   1 mark
                child_dose = adult_dose * age_in_years /(age_in_years+12)   1 mark
          elif rule == "Clark":   2 marks
                weight_in_kg = eval(input("Enter the weight in Kg:"))   2 marks
                weight_in_lb = weight_in_kg * 2.2   1 mark
                child_dose = adult_dose * weight_in_lb/150   1 mark
                print("Child dose according to ", rule," rule is:", child_dose, " mg")   2 marks
          else:
                print("Error the rule entered is not valid")   2 marks

Question 3:   **(15 marks)**

Write a Python program that gets as an input a barcode number of a drug and prints out a message that indicates the country of origin. The barcode number contains 13 digits. The first few digits at the left-hand side of the barcode number indicate the country of origin.
Use the country codes in the following short list below.

Prefix	Country
30 to 37	France
400 to 440	Germany
622	Egypt
Otherwise	some other country

For example, the barcode should start with 622 if the drug is made in Egypt, or a number between 400 and 440, inclusively, if made in Germany.

Example 1:
Input:
   Enter the barcode: 4401077100613
Output:
   This drug is made in Germany

Solution:

barcode = eval(input("Enter the barcode:"))   2 marks
prefix = barcode // 10000000000 # 13digit-3digits = 10 zeros   2 marks
print("prefix=",prefix)
if prefix >= 300 and prefix <=379:   2 marks
     origin = "France"   1 mark
elif prefix >= 400 and prefix <=440:   2 marks
     origin = "Germany"   1 mark
elif prefix == 622:   1 marks
     origin = "Egypt"   1 mark
else:
     origin = "some other country"   1 mark
print("This drug origin is ", origin)   2 marks

Question 4:   **(27 marks)**

Write a Python algorithm that gets three heart beat readings for the same patient. The highest and lowest values should be discarded and the algorithm should print the middle value.

```
Example 1:                              Example 2:
Input:                                  Input:
    Enter the first reading: 76             Enter the first reading: 76
    Enter the second reading: 61            Enter the second reading: 76
    Enter the third reading: 93             Enter the third reading: 93
Output:                                 Output:
    The estimated heart beat rate is 76     The estimated heart beat rate is 76
```


Solution:

a = eval(input("Enter the first reading:"))	2 marks
b = eval(input("Enter the first reading:"))	2 marks
c = eval(input("Enter the first reading:"))	2 marks
print(a,b,c)	
if a>=b:	2 marks
if b>=c:	2 marks
rate=b	1 mark
elif c>=a:	2 marks
rate=a	1 mark
else:	1 mark
rate=c	1 mark
else:	1 mark
if a>=c:	2 marks
rate=a	1 mark
elif b>=c:	2 marks
rate=c	1 mark
else:	1 mark
rate=b	1 mark
print("The estimated heart beat rate is ",rate)	2 marks

Extra sheet: