C++ Programming – ENG TECH 1CP3
Data Structures

Lab L6

1. The pharmacokinetics of a drug given by constant intravenous infusion follows a zero-order input process in which the drug is directly infused into the systemic blood circulation. The steady-state drug concentration in the plasma is given by

$$C = \frac{R}{V\,k}$$

where,

R = infusion rate (mg/h), k = elimination rate constant (per hour),
V = volume of distribution (mL), C = steady state concentration (μg/mL).

Write a program that will calculate the steady-state drug concentration in the plasma. Generate three random numbers satisfying the following conditions,

$$0.1 \le k \le 0.3, \quad 5 \le R \le 30, \quad 5000 \le V \le 25000$$

where, k and R are floating point numbers and V is an integer. Store these values in a structure called **SSC** (Steady State Concentration). Use this structure to calculate the concentration. Finally the program should display input parameters and the drug concentration. Print k, R and C to 3 decimal places and V as an integer number.

2. Write a program that reads daily carbon monoxide readings (measured in ppm) from a file collected four times per day. The first four readings in a file collected on day 01 in morning, afternoon, evening and night respectively. The next 4 readings are for day 02 and so on. The program should use a structure to store daily carbon monoxide values. Use 1D array of 31 structures to hold all readings. Loop through the array to display values in a table format. Each row of the table should contain day#, morning, afternoon, evening and night readings. Furthermore, output **DANGER** at the end of the rows that have a reading of 200 ppm or greater. At the end, your program should display four averages (morning, afternoon, evening, and night) of the rows containing **DANGER**.

Sample Data:

```
 38
210
 14
  3
214
222
 82
176
225
```

174
5
282
23
294
103
177
90
125
245
189
276
272
130
234
142
59
152
80
156
276
142
161
235
260
42
173
205
160
162
71
26
236
265
103
193
227
61
41
245
74
287
83
229
114
99
207

255
124
202
102
97
118
58
79
13
221
13
154
103
83
51
182
32
100
293
105
224
280
216
196
267
9
114
36
260
50
124
188
170
132
134
285
68
91
144
201
137
67
79
298
119
120
71

66
188
300
77
4
291
17
297
241
241
290
170
151
277
43
103
250
162
213
114
95

Create a Word .doc file that contains the source code and a screen captures of the console window as the program is running, for all C++ programs. Save this file as YourName_Lab_6.doc and upload and submit to the appropriate AVENUE lab assignment drop-box.