The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING

2016 Canadian Computing Competition: Marking Instructions

Sponsor:

WATERLOO
MATHEMATICS

2016 Canadian Computing Competition
General Marking Instructions

1. You should only be reading this document after the contest has been completed. Be sure to read all of the items before beginning marking.

2. *If your students used the On-line Grader, you can ignore the remainder of these instructions. In particular, you do not need to send in any grading sheets or solutions for your students.*

3. Students should indicate whether they wish the Senior or Junior contest to be marked. Mark the only the contest which they indicate on the "Student Information Form."

4. All data files (including Junior Problem data files) will be available at

   `http://cemc.uwaterloo.ca/contests/computing.html`

   You will require username and password to view the data and marking schemes from the above URL, which is:

   > username: ccc2016
   > password: !!2016ccc??

   where the characters are **lower-case** "c" and there are two exclamation marks at the beginning and two question marks at the end of the password.

5. If you have any questions, please do not hesitate to email me (Troy Vasiga) at `troy.vasiga@uwaterloo.ca` and I will try to assist you.

6. Within a particular question, if there is a spelling mistake in the students output, only deduct marks on the first test case where the error occurs, not on all test cases. Spelling mistakes can include incorrect prompting or incorrect output. A spelling mistake reduces the points on that test case by a factor of one-half (rounded down) (i.e., if the test case was out of 3 and there was a spelling mistake, the student would only obtain 1 out of 3).

7. The Junior contest questions expect only keyboard input (which you will type in) and output to the screen (which you can compare against the testing output in the marking document).

8. The Senior contest questions expected file input (i.e., `s1.in` for Problem S1, `s2.in` for Problem S2, etc.) and output to the screen. You will be required to rename some input files for some questions, but most testing will be done with very few files.

9. The Senior problems S3, S4 and S5 should only be given 5 seconds of execution time per test case on a Pentium-4 class computer running at 2GHz. Most inefficient solutions should take a very very long time (like several minutes or even hours): *these solutions should receive zero*. Please stop the program execution and record a score of zero if the time limit is exceeded.

10. If you have a student (or students) with a score of at least **40/75** on the **Senior** contest and/or a student or students with a score of at least **55/75** on the **Junior** contest, please include hard-copies (printouts) and soft-copies (CD-ROM or USB key) of the student programs (i.e., code). You do not need to include the output of the student tests. Please be sure to clearly indicate on the paper and CD-ROM/key.

   - school name
   - school number
   - the names of all student submissions on the CD-ROM/key
   - which contest (Junior/Senior) the student completed

11. Good luck, and thank you for taking an interest in computing.

Junior Contest Marking Scheme

Problem J1: Tournament Selection

Input	Output	Marks Awarded
W W W L W W	1	3
L L L L L L	−1	3
W L L L W W	2	3
L L L L W W	3	3
L L W W W W	2	3

Problem J2: Magic Squares

Note that to earn points, students must get both test cases in each batch.

Batch	Input	Output	Marks Awarded
1	16 14 3 13 5 11 6 8 9 7 10 12 4 2 15 1	not magic	3
	16 2 3 13 5 11 10 8 9 7 6 12 4 14 15 1	magic	
2	1 15 14 4 12 6 7 9 8 10 11 5 13 3 2 6	not magic	3
	16 3 2 13 5 10 11 8 9 6 7 12 4 15 14 1	magic	
3	16 3 2 13 5 10 11 8 9 4 7 12 6 15 14 1	not magic	3
	16 3 2 13 5 10 11 8 9 6 7 12 4 15 14 1	magic	
4	16 2 3 13 5 11 10 8 9 7 6 12 4 14 15 1	magic	3
	1 15 11 5 12 6 7 9 8 14 10 4 13 3 2 6	not magic	
5	16 2 3 13 4 11 10 8 9 7 6 12 5 14 15 1	not magic	3
	6 2 3 13 5 1 10 8 4 14 5 1 9 7 6 2	magic	

Problem J3: Hidden Palindrome

Input	Output	Marks
madam	5	3
hefjhhgatlmn	2	3
badefghhgfghbcb	6	3
abccbaabccbadefghhhgfabcdeedc	12	3
abacbcabcdefcbaabadeedcdefghababahgf	11	3

Problem J4: Arrival Time

Input	Output	Marks
00:00	02:00	1
03:40	05:40	1
05:20	07:40	1
06:20	09:40	1
06:40	10:10	1
07:00	10:30	1
09:00	11:30	1
10:00	12:00	1
13:00	15:00	1
14:20	17:40	1
15:20	19:10	1
16:40	19:50	1
18:40	20:50	1
22:00	00:00	1
23:40	01:40	1

Problem J5: Tandem Bicycle

Please note that execution may be at most 3 seconds. If the time limit is exceeded, score 0 for that test case.

Test case	Filename	Output	Marks
1	s2.1.in	928587	1
	s2.2.in	4973791	
2	s2.3.in	53081224	1
3	s2.4.in	116265	1
4	s2.5.in	99913406	1
5	s2.6.in	8221006	1
6	s2.7.in	93502922	1
7	s2.8.in	50480349	1
8	s2.9.in	100000000	1
9	s2.10.in	834768	1
	s2.11.in	51973246	
10	s2.12.in	74223751	1
	s2.13.in	146769	
11	s2.14.in	99967006	1
12	s2.15.in	14290520	1
13	s2.16.in	96997655	1
14	s2.17.in	75394040	1
15	s2.18.in	100000000	1

Senior Problem Marking Scheme

Problem S1: Ragaman

Test case	Filename	Output	Marks
1	s1.1.in	A	2
	s1.2.in	N	
2	s1.3.in	N	2
	s1.4.in	A	
3	s1.5.in	N	2
	s1.6.in	A	
4	s1.7.in	N	2
	s1.8.in	A	
5	s1.9.in	A	2
	s1.10.in	A	
	s1.11.in	N	
6	s1.12.in	N	2
	s1.13.in	A	
7	s1.14.in	N	1
	s1.15.in	A	
8	s1.16.in	N	2
	s1.17.in	A	
	s1.18.in	A	

Problem S2: Tandem Bicycle

Please note that execution may be at most 3 seconds. If the time limit is exceeded, score 0 for that test case.

Test case	Filename	Output	Marks
1	s2.1.in	928587	1
	s2.2.in	4973791	
2	s2.3.in	53081224	1
3	s2.4.in	116265	1
4	s2.5.in	99913406	1
5	s2.6.in	8221006	1
6	s2.7.in	93502922	1
7	s2.8.in	50480349	1
8	s2.9.in	100000000	1
9	s2.10.in	834768	1
	s2.11.in	51973246	
10	s2.12.in	74223751	1
	s2.13.in	146769	
11	s2.14.in	99967006	1
12	s2.15.in	14290520	1
13	s2.16.in	96997655	1
14	s2.17.in	75394040	1
15	s2.18.in	100000000	1

Problem S3: Phonomenal Reviews

Please note that execution may be at most 3 seconds. If the time limit is exceeded, score 0 for that test case.

Test case	Filename	Output	Marks
1	s3.1.in	1	3
	s3.2.in	3	
	s3.3.in	19	
	s3.4.in	3	
	s3.5.in	13	
2	s3.6.in	7	3
	s3.7.in	23	
	s3.8.in	5	
	s3.9.in	18	
3	s3.10.in	15	3
	s3.11.in	27	
	s3.12.in	9	
	s3.13.in	23	
4	s3.14.in	558	4
	s3.15.in	989	
	s3.16.in	1417	
	s3.17.in	1848	
	s3.18.in	1893	
5	s3.19.in	3300	2
	s3.20.in	100777	
	s3.21.in	45124	
	s3.22.in	156812	
	s3.23.in	5	
	s3.24.in	192060	
	s3.25.in	199665	

Problem S4: Combining Riceballs

No part marks awarded. Please note that execution may be at most 3 seconds. If the time limit is exceeded, the score is 0 for that test case.

Test case	Filename	Output	Marks
1	s4.1.in	3	1
	s4.2.in	150	
	s4.3.in	1560162	
	s4.4.in	449570	
	s4.5.in	1000000	
	s4.6.in	54	
	s4.7.in	13	
	s4.8.in	4000000	
2	s4.9.in	996600	2
	s4.10.in	913122	
	s4.11.in	776962	
	s4.12.in	7701	
	s4.13.in	4812	
	s4.14.in	893565	
	s4.15.in	778444	
	s4.16.in	1089	
	s4.17.in	999990	
	s4.18.in	999990	
	s4.19.in	1	
	s4.20.in	14	

Test case	Filename	Output	Marks
3	s4.21.in	999990	5
	s4.22.in	244123	
	s4.23.in	1138701	
	s4.24.in	420420	
	s4.25.in	887900	
	s4.26.in	666777	
	s4.27.in	3000000	
	s4.28.in	1500000	
	s4.29.in	555210	
	s4.30.in	980463	
	s4.31.in	272	
4	s4.32.in	1732199	7
	s4.33.in	1443251	
	s4.34.in	3197257	
	s4.35.in	997266	
	s4.36.in	886531	
	s4.37.in	1576101	
	s4.38.in	799199	
	s4.39.in	977788	
	s4.40.in	9001	
	s4.41.in	996600	
	s4.42.in	2372	
	s4.43.in	1840	

Problem S5: Circle of Life

Note that the time limit for execution is 3 seconds. If the time limit is exceeded, a score of 0 is given for that test case.

Test Case	Filename	Output	Marks
1	s5.1.in	0111101101000110	1
2	s5.2.in	101011010110100	6
	s5.3.in	101011110001001	
	s5.4.in	0011101011	
	s5.5.in	010110010101101	
	s5.6.in	110000011011110	
	s5.7.in	010111001111110	
3	s5.8.in	s5.8.out**	4
	s5.9.in	s5.9.out**	
	s5.10.in	s5.10.out**	
	s5.11.in	s5.11.out**	
4	s5.12.in	s5.12.out**	4
	s5.13.in	s5.13.out**	
	s5.14.in	s5.14.out**	
	s5.15.in	s5.15.out**	

** See data files. Tools such as `diff` are very helpful.