ECE118

First Test

1st October 2020

Name:

Student number:

Sign here if you did not give or receive aid in any form during this test, and did not consult any written or printed material apart from this test:

Don’t write in these boxes.

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| Question | Out of | Grade |
| 1 | 33 |  |
| 2 | 33 |  |
| 3 | 34 |  |

1.

Exactly what would be printed by this program?

Here’s a clue: the first line would be

a: 42 (int)

NO CALCULATORS

void show(const string question, const int n)

{ cout << question << ": " << n << " (int)\n"; }

void show(const string question, const double d)

{ cout << question << ": " << d << " (double)\n"; }

void show(const string question, const bool b)

{ cout << question << ": " << b << " (bool)\n"; }

void main()

{ show("a", 6 \* 7);

show("b", 2\*2\*2\*2 / 2\*2\*2\*2);

show("c", 1+2 \* 3+4 \* 5+6);

show("d", 10 / 3 \* 6);

show("e", 1 / 4 + 1 / 4 + 1 / 2);

show("f", 382757 % 2);

show("g", 879321729 % 1000);

show("h", (int)(1.24 \* 4));

show("i", 382757 - 382757 / 1000 \* 1000);

show("j", 382757.0 - 382757 / 1000 \* 1000);

show("k", 382757 - 382757 / 1000.0 \* 1000);

show("l", 382757 - 382757 / 1000 \* 1000.0);

show("m", 382757 - 382757.0 / 1000 \* 1000);

show("n", 4 / 3 > 1);

show("o", 4 / 3 > 1.0);

show("p", 15 / 2 / 2.0); }

part q: get parts a to p right!

2. For this question, only consider positive numbers.

a. Analyse this function

void aaa(int x)

{ if (x == 0)

new\_line();

else

{ print("+");

aaa(x - 1); } }

State in plain English what the function does - its overall effect, not a description of the individual statements, and show how you arrived at your conclusion.

b. Now do the same for this function

void bbb(int x)

{ if (x == 0)

{ print("\*");

new\_line(); }

else

{ bbb(x - 1);

aaa(x); } }

c. What does this function compute?

int ccc(int x)

{ if (x <= 1)

return 1;

else

{ const int a = ccc(x - 1);

const int b = ccc(x - 1);

return a + b + 1; } }

what is the value of ccc(2)?

what is the value of ccc(4)?

what is the value of ccc(9)? Remember to show your work.

3. Use only constants, no variables in your answers to this question.

Use recursive functions to cause repetition when needed.

a. Write a function PrintArray(R, x, y), where R is an array of ints. It should print all the ints from position x to position y in the array.

e.g. const int b[] = { 7, 3, 2, 6, 15, 3, 9, 5 };

PrintArray (b, 2, 5);

prints 2 6 15 3.

b. Write another function AvgArray(R, n), where R is an array of ints, and n is the size of that array. It should return as its result the average of all the ints in the array.

e.g. cout << AvgArray (b, 8)

prints 6.25 because 7+3+2+6+15+3+9+5 = 50

c. Write a function RangeArray(R, n), where R is an array of ints, and n is the size of that array. It should return as its result the difference between the largest and the smallest ints in the array

e.g. RangeArray (b, 8) is 13, because that is 15 - 2