Problem 1:

#include <iostream>

using namespace std;

int main()

{

int longest = 0; //The length of the longest chain

int max\_start = 0; //The starting value of the longest chain

//use these for problem 1

long long largestKvalue = 2;

int largestKnValue = 2;

for(int n = 2; n <= 1000000; n++)

{

long long k = n; //Make a working copy

int this\_terms = 0; //Number of terms in this particular sequence

cout<<n<<": ";

while(k != 1)

{

this\_terms++;

if(k % 2 == 0)

k = k / 2;

else

{

if( k > (\_I64\_MAX - 1) / 3) //Test for overflow

{

cout << "Overflow: " << k << ' ' << n << endl;

system("pause");

break;

}

k = 3 \* k + 1;

//added this statement for post exploration excercise 1

if(k >= largestKvalue)

{

largestKvalue = k;

largestKnValue = n;

}

}

cout<<k<< " ";

}

cout<<endl;

if(this\_terms > longest)

{

longest = this\_terms;

max\_start = n;

}

//added this check for post exploration excercise 1

if(this\_terms == longest && largestKnValue != n)

{

longest = this\_terms;

max\_start = n;

cout<<endl<<"ANSWER is when n = " <<n<< endl;

break;

}

cout << "Longest chain: " << longest << endl;

cout << "Starts at: " << max\_start << endl;

cout << endl<< "largest value: " << largestKvalue << endl;

cout << "Starts at: " << largestKnValue << endl;

system("pause");

return 0;

}

1: for problem 1, I found the lowest starting value (n) that had the longest sequence. During this check, I looked to see what the largest value was for every n value(largestKvalue) and then stored the n value for that one (largestKnValue). If it was the longest sequence, I checked if it also was not the largestKnValue. This returned 18 with a chain of 20, but a previous sequence, 15, had the largest value of 160.

2.

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**Sequence:  -14   -7  -20  -10   -5**

**Starting Val: -5**

**Longest chain: 4**

**LOOPED**

**----------------------**

**Sequence:  -20  -10   -5  -14   -7**

**Starting Val: -7**

**Longest chain: 5**

**LOOPED**

**----------------------**

**Sequence:  -26  -13  -38  -19  -56  -28  -14   -7  -20  -10   -5  -14   -7**

**Starting Val: -9**

**Longest chain: 12**

**LOOPED**

**----------------------**

**Sequence:   -5  -14   -7  -20  -10   -5**

**Starting Val: -10**

**Longest chain: 12**

**LOOPED**

**----------------------**

**Sequence:  -38  -19  -56  -28  -14   -7  -20  -10   -5**

**Starting Val: -13**

**Longest chain: 12**

**LOOPED**

**----------------------**

**Sequence:   -7  -20  -10   -5  -14   -7**

**Starting Val: -14**

**Longest chain: 12**

**LOOPED**

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**Sequence:  -50  -25  -74  -37 -110  -55 -164  -82  -41 -122  -61 -182  -91 -272 -136  -68  -34  -17**

**Starting Val: -17**

**Longest chain: 19**

**LOOPED**

**----------------------**

**Sequence:   -9  -26  -13  -38  -19  -56  -28  -14   -7  -20  -10   -5  -14   -7**

**Starting Val: -18**

**Longest chain: 19**

**LOOPED**

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**Sequence:  -56  -28  -14   -7  -20  -10   -5  -14   -7**

**Starting Val: -19**

**Longest chain: 19**

**LOOPED**

**----------------------**

**Sequence:  -10   -5  -14   -7 – 20  -10   -5**

**Starting Val: -20**

**Longest chain: 19**

**LOOPED**