Họ và tên: NGUYỄN ĐÌNH TIẾN

MSSV: 20168533

Lớp: VUWIT15

Project 1

Program Language: Python

Tuần: 5

Project Euler

Problem 13:

1.Đề bài:

Work out the first ten digits of the sum of the following one-hundred 50-digit numbers.

37107287533902102798797998220837590246510135740250  
46376937677490009712648124896970078050417018260538  
74324986199524741059474233309513058123726617309629  
91942213363574161572522430563301811072406154908250  
23067588207539346171171980310421047513778063246676  
89261670696623633820136378418383684178734361726757  
28112879812849979408065481931592621691275889832738  
44274228917432520321923589422876796487670272189318  
47451445736001306439091167216856844588711603153276  
70386486105843025439939619828917593665686757934951  
62176457141856560629502157223196586755079324193331  
64906352462741904929101432445813822663347944758178  
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80181199384826282014278194139940567587151170094390  
35398664372827112653829987240784473053190104293586  
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71693888707715466499115593487603532921714970056938  
54370070576826684624621495650076471787294438377604  
53282654108756828443191190634694037855217779295145  
36123272525000296071075082563815656710885258350721  
45876576172410976447339110607218265236877223636045  
17423706905851860660448207621209813287860733969412  
81142660418086830619328460811191061556940512689692  
51934325451728388641918047049293215058642563049483  
62467221648435076201727918039944693004732956340691  
15732444386908125794514089057706229429197107928209  
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18336384825330154686196124348767681297534375946515  
80386287592878490201521685554828717201219257766954  
78182833757993103614740356856449095527097864797581  
16726320100436897842553539920931837441497806860984  
48403098129077791799088218795327364475675590848030  
87086987551392711854517078544161852424320693150332  
59959406895756536782107074926966537676326235447210  
69793950679652694742597709739166693763042633987085  
41052684708299085211399427365734116182760315001271  
65378607361501080857009149939512557028198746004375  
35829035317434717326932123578154982629742552737307  
94953759765105305946966067683156574377167401875275  
88902802571733229619176668713819931811048770190271  
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36270218540497705585629946580636237993140746255962  
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34413065578016127815921815005561868836468420090470  
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11487696932154902810424020138335124462181441773470  
63783299490636259666498587618221225225512486764533  
67720186971698544312419572409913959008952310058822  
95548255300263520781532296796249481641953868218774  
76085327132285723110424803456124867697064507995236  
37774242535411291684276865538926205024910326572967  
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29798860272258331913126375147341994889534765745501  
18495701454879288984856827726077713721403798879715  
38298203783031473527721580348144513491373226651381  
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40957953066405232632538044100059654939159879593635  
29746152185502371307642255121183693803580388584903  
41698116222072977186158236678424689157993532961922  
62467957194401269043877107275048102390895523597457  
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11306739708304724483816533873502340845647058077308  
82959174767140363198008187129011875491310547126581  
97623331044818386269515456334926366572897563400500  
42846280183517070527831839425882145521227251250327  
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32238195734329339946437501907836945765883352399886  
75506164965184775180738168837861091527357929701337  
62177842752192623401942399639168044983993173312731  
32924185707147349566916674687634660915035914677504  
99518671430235219628894890102423325116913619626622  
73267460800591547471830798392868535206946944540724  
76841822524674417161514036427982273348055556214818  
97142617910342598647204516893989422179826088076852  
87783646182799346313767754307809363333018982642090  
10848802521674670883215120185883543223812876952786  
71329612474782464538636993009049310363619763878039  
62184073572399794223406235393808339651327408011116  
66627891981488087797941876876144230030984490851411  
60661826293682836764744779239180335110989069790714  
85786944089552990653640447425576083659976645795096  
66024396409905389607120198219976047599490197230297  
64913982680032973156037120041377903785566085089252  
16730939319872750275468906903707539413042652315011  
94809377245048795150954100921645863754710598436791  
78639167021187492431995700641917969777599028300699  
15368713711936614952811305876380278410754449733078  
40789923115535562561142322423255033685442488917353  
44889911501440648020369068063960672322193204149535  
41503128880339536053299340368006977710650566631954  
81234880673210146739058568557934581403627822703280  
82616570773948327592232845941706525094512325230608  
22918802058777319719839450180888072429661980811197  
77158542502016545090413245809786882778948721859617  
72107838435069186155435662884062257473692284509516  
20849603980134001723930671666823555245252804609722  
53503534226472524250874054075591789781264330331690

2.Thuật toán:

- Tính tổng 100 số có 50 chữ số

- Tách kết quả thành chuỗi và cho vào List, lấy ra 10 số đầu tiên

3.Đáp án: 5537376230

4.Mã nguồn:

# Work out the first ten digits of the sum of the following one-hundred 50-digit numbers.

sequence = '''37107287533902102798797998220837590246510135740250

46376937677490009712648124896970078050417018260538

74324986199524741059474233309513058123726617309629

91942213363574161572522430563301811072406154908250

23067588207539346171171980310421047513778063246676

89261670696623633820136378418383684178734361726757

28112879812849979408065481931592621691275889832738

44274228917432520321923589422876796487670272189318

47451445736001306439091167216856844588711603153276

70386486105843025439939619828917593665686757934951

62176457141856560629502157223196586755079324193331

64906352462741904929101432445813822663347944758178

92575867718337217661963751590579239728245598838407

58203565325359399008402633568948830189458628227828

80181199384826282014278194139940567587151170094390

35398664372827112653829987240784473053190104293586

86515506006295864861532075273371959191420517255829

71693888707715466499115593487603532921714970056938

54370070576826684624621495650076471787294438377604

53282654108756828443191190634694037855217779295145

36123272525000296071075082563815656710885258350721

45876576172410976447339110607218265236877223636045

17423706905851860660448207621209813287860733969412

81142660418086830619328460811191061556940512689692

51934325451728388641918047049293215058642563049483

62467221648435076201727918039944693004732956340691

15732444386908125794514089057706229429197107928209

55037687525678773091862540744969844508330393682126

18336384825330154686196124348767681297534375946515

80386287592878490201521685554828717201219257766954

78182833757993103614740356856449095527097864797581

16726320100436897842553539920931837441497806860984

48403098129077791799088218795327364475675590848030

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59959406895756536782107074926966537676326235447210

69793950679652694742597709739166693763042633987085

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65378607361501080857009149939512557028198746004375

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91430288197103288597806669760892938638285025333403

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67720186971698544312419572409913959008952310058822

95548255300263520781532296796249481641953868218774

76085327132285723110424803456124867697064507995236

37774242535411291684276865538926205024910326572967

23701913275725675285653248258265463092207058596522

29798860272258331913126375147341994889534765745501

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38298203783031473527721580348144513491373226651381

34829543829199918180278916522431027392251122869539

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29746152185502371307642255121183693803580388584903

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62467957194401269043877107275048102390895523597457

23189706772547915061505504953922979530901129967519

86188088225875314529584099251203829009407770775672

11306739708304724483816533873502340845647058077308

82959174767140363198008187129011875491310547126581

97623331044818386269515456334926366572897563400500

42846280183517070527831839425882145521227251250327

55121603546981200581762165212827652751691296897789

32238195734329339946437501907836945765883352399886

75506164965184775180738168837861091527357929701337

62177842752192623401942399639168044983993173312731

32924185707147349566916674687634660915035914677504

99518671430235219628894890102423325116913619626622

73267460800591547471830798392868535206946944540724

76841822524674417161514036427982273348055556214818

97142617910342598647204516893989422179826088076852

87783646182799346313767754307809363333018982642090

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71329612474782464538636993009049310363619763878039

62184073572399794223406235393808339651327408011116

66627891981488087797941876876144230030984490851411

60661826293682836764744779239180335110989069790714

85786944089552990653640447425576083659976645795096

66024396409905389607120198219976047599490197230297

64913982680032973156037120041377903785566085089252

16730939319872750275468906903707539413042652315011

94809377245048795150954100921645863754710598436791

78639167021187492431995700641917969777599028300699

15368713711936614952811305876380278410754449733078

40789923115535562561142322423255033685442488917353

44889911501440648020369068063960672322193204149535

41503128880339536053299340368006977710650566631954

81234880673210146739058568557934581403627822703280

82616570773948327592232845941706525094512325230608

22918802058777319719839450180888072429661980811197

77158542502016545090413245809786882778948721859617

72107838435069186155435662884062257473692284509516

20849603980134001723930671666823555245252804609722

53503534226472524250874054075591789781264330331690'''

list\_sequence = sorted(sequence.split('\n'))

total = 0

for index, item in enumerate(list\_sequence):

total += int(item)

list\_digits = list(str(total))

ten\_digits = ""

for i in range(0,10):

ten\_digits += str(list\_digits[i])

print(ten\_digits)

Problem 14:

1.Đề bài:

The following iterative sequence is defined for the set of positive integers:

*n* → *n*/2 (*n* is even)  
*n* → 3*n* + 1 (*n* is odd)

Using the rule above and starting with 13, we generate the following sequence:

13 → 40 → 20 → 10 → 5 → 16 → 8 → 4 → 2 → 1

It can be seen that this sequence (starting at 13 and finishing at 1) contains 10 terms. Although it has not been proved yet (Collatz Problem), it is thought that all starting numbers finish at 1.

Which starting number, under one million, produces the longest chain?

**NOTE:** Once the chain starts the terms are allowed to go above one million.

2.Thuật toán:

- Xét tất cả các số dưới 1.000.000

- Phân tích từng số theo quy tắc cho đến khi bằng 1 thì dừng lại

- Mỗi số trong chuỗi phân tích sẽ được thêm vào 1 list, nếu độ dài list lớn hơn độ dài list lớn nhất thì cập nhật

3.Đáp án: 837799

4.Mã nguồn:

# Which starting number, under one million, produces the longest chain?

list\_longest = []

number = 2

while number < 1000000:

list\_check = [number]

number\_check = number

while number\_check != 1:

if number\_check % 2 == 0:

number\_check = number\_check / 2

list\_check.append(number\_check)

elif number\_check % 2 == 1:

number\_check = number\_check \* 3 + 1

list\_check.append(number\_check)

if len(list\_check) > len(list\_longest):

list\_longest = list\_check

number += 1

print(list\_longest[0])

Problem 20:

1.Đề bài:

*n*! means *n* × (*n* − 1) × ... × 3 × 2 × 1

For example, 10! = 10 × 9 × ... × 3 × 2 × 1 = 3628800,  
and the sum of the digits in the number 10! is 3 + 6 + 2 + 8 + 8 + 0 + 0 = 27.

Find the sum of the digits in the number 100!

2.Thuật toán:

- Tính số 100 giai thừa

- Ép thành chuỗi và cho vào list

- Xét list và tính tổng từng chữ số một

3.Đáp án: 648

4.Mã nguồn:

# Tính tổng tất cả các kí tự của số 100!

import math

n = math.factorial(100)

sum = 0

digits = list(str(n))

for index, item in enumerate(digits):

sum += int(item)

print(sum)