Examples 0 in The Radix

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Examples 0 in The Radix

Find appropriate numbers to fill in the blanks in each of the sequences in the problems, and rewrite the sequence as in the example below.

Example

Problem: 0, 1, 2, _, _, 5, _, _, 8, 9 … 101, 102, _, 104 …

Solution: 0, 1, 2, **3**, **4**, 5, **6**, **7**, 8, 9 … 101, 102, **103**, 104 …

0.
0, 1, 10, 11, 100, 101, 110, _, 1000, 1001, _, 1011, 1100,

1101, _, 1111, _ . . . 111011, _, _, _, _, _, _, 1000010 . . .

2

1.

_, 1, 2, 3, _, 11, _, _, 20, 21, 22, _, _, 31, _, _, _, _, 102, 103,

_, _, _, 113, _, _, _, _, _, 131, _, _, _ . . . 30323, _, _, _, _, _,

3100 . . . 333332, _, _, _ . . .

2.

0, 1, 2, _, _, 12, _, _, _, 100, 101, _, _, 111, _, _, 121, 122, _,

_, 202, _, _, 212, _, _, 222, _, _, 1002, _, _, 1012, _ . . .

212201, _, _, _, _, _, _, _, _, _ . . .

3.

_, _, 2, 3, _, _, 11, _, 13, 14, 20, _, _, 23, 24, _, _, 32 . . .

343403, _, _, _ . . . _, _, 3444440 . . . 3444443, _, _, _ . . .

4.

0, 1, 2, _, _, 5, _, 10, _, _, _, _, _, _, _, 21 . . .

5.

4, 5, 6, _, _, _, _, 14, _, _, _, 21, 22, 23, _, _, _, _, _, _, 33, _,

_, _, _, _, 42, 43, 44, _, _, _, _, _, 53, 54, 55, _, _, _, 62, 63,

64, _, _, _, _, _, _, _, 105, _, _, _, _, _, 114, 115, _, _ . . .

53553, _, _, _, _, 53561 . . . _, _, _, _, _, _, _, _, 10000000,

_ . . .

6.

-2110, _, _, _, -2100, _, _, _, _, -2023 . . . -101, _, -33, _, _,

_, _, _, -21, -20, _, _, _, _, -3, _, _, _, _, _, _, 10, 11, _, _, _,

_, 22, _, 30 . . . _, _, _, 200, _, _, _, _, _, 212 . . .

7.

5, 6, 7, 8, 9, _, B, _, 10, 11, 12 . . . _, 1C, _, 21, 22 . . .

9ABB, 9ABC, 9AC0, 9AC1, 9AC2 . . . CCABC, _, _ . . . _, _,

_, CCCC01 . . . _, _, _, _, _, _, 1000001 . . .

8.

15, 16, 17, _, _, _, 22, 23 . . . 2737, _, _, _, 2742 . . . 6428,

_ . . . _, _, _, 10001 . . . _, _, _, _, 810001 . . .

9.

59ADCE, 59ADCF, _, _, _, 59ADD3, 59ADD4 . . . FACDAE,

_, FACDB0, _, FACDB2 . . . 100009E, _, _, _ . . . _, _, _, _, 100000A2 . . .

A.

-DG00, _, _, _, _, _, _, _, -DFG9, -DFG8 . . . _, _, _, _, _, -

3A88 . . . -2000, _, _ . . . AFDE, AFDF, _, AFE0, AFE1 . . .

FEFE, FEFF, _, _, _, FEG2 . . . GF9E, _, GF9G, _, _,

GFA2 . . . GGFF, _, _, _ . . . GGGE, _, _, _ . . . _, _, _, _, B000001 . . .

Suggestions or Solutions
To the Problem 0

0, 1, 10, 11, 100, 101, 110, _, 1000, 1001, _, 1011, 1100, 1101, _, 1111, _ . . . 111011, _, _, _, _, _, _, 1000010 . . .

The alphabets are 0 and 1.

We can assume that the entries in the sequence are on the base 2, since we use 2 alphabets to make an entry. Then, a digit is max or full when it is 1.

The sequence begins with 0, and the entries increase as the sequence proceeds by an increment of 1.
Therefore, the sequence can proceed the way as follows.

0, 1, 10, 11, 100, 101, 110, **111**, 1000, 1001, **1010**, 1011, 1100, 1101, **1110**, 1111, **10000** . . . 111011, **111100**, **111101**, **111110**, **111111**, **1000000**, **1000001**, 1000010 . . .

Suggestions or Solutions
To the Problem 1

_, 1, 2, 3, _, 11, _, _, 20, 21, 22, _, _, 31, _, _, _, _, 102, 103, _, _, _, 113, _, _, _, _, _, 131, _, _, _ . . . 30323, _, _, _, _, _, 3100 . . . 333332, _, _, _ . . .

The alphabets are 0, 1, 2, and 3.
We can assume that the entries in the sequence are on the base 4, since we use 4 alphabets to make entries. Then, a digit is max or full when it is 3. The first known entry is 1, and the entries increase by 1. So the entries have to decrease by 1 as the sequence proceeds backward. Thus, the sequence can proceed the way as follows.

0, 1, 2, 3, **10**, 11, **12**, **13**, 20, 21, 22, **23**, **30**, 31, **32**, **33**, **100**, **101**, 102, 103, **110**, **111**, **112**, 113, **120**, **121**, **122**, **123**, **130**, 131, **132**, **133**, **134** . . . 30323, **30330**, **30331**, **30332**, **30333**, **31000**, 31001 . . . 333332, **333333**, **1000000**, **1000001** . . .

Suggestions or Solutions
To the Problem 2

0, 1, 2, _, _, 12, _, _, _, 100, 101, _, _, 111, _, _, 121, 122, _, _, 202, _, _, 212, _, _, 222, _, _, 1002, _, _, 1012, _ . . . 212201, _, _, _, _, _, _, _, _, _ . . .

The entries are on the base 3, since the alphabets are 0, 1, and 2. So a digit is max when it is 2.

The sequence begins with 0, and the entries increase by 1. Thus, the sequence can proceed the way as follows.

0, 1, 2, **10, 11**, 12, **20, 21, 22**, 100, 101, **102, 110**, 111, **112, 120**, 121, 122, **200, 201**, 202, **210, 211**, 212, **220, 221**, 222, **1000, 1001**, 1002, **1010, 1011**, 1012, **1020** . . ., 212201, **212202, 212210, 212211, 212212, 212220, 212221, 212222, 220000, 220001** . . .

Suggestions or Solutions
To the Problem 3

_, _, 2, 3, _, _, 11, _, 13, 14, 20, _, _, 23, 24, _, _, 32 . . .
343403, _, _, _ . . . _, _, 3444440 . . . 3444443, _, _, _ . . .

The entries are on the base 5, since there are five alphabets, 0, 1, 2, 3, and 4. So a digit is full when it is 4.

The first known entry 2, and the entries increase by 1. So the entries decrease by 1 as the sequence proceeds backward. Thus, the sequence proceeds the way as follows.

0, **1**, 2, 3, **4**, **10**, 11, **12**, 13, 14, 20, **21, 22**, 23, 24, **30, 31**, 32 . . . 343403, **343404, 343410, 343411** . . . **3444433, 3444434**, 3444440 . . . 3444443, **3444444, 4000000, 4000001** . . .

Suggestions or Solutions
To the Problem 4

0, 1, 2, _, _, 5, _, 10, _, _, _, _, _, _, _, 21 . . .

The radix is 7, since the alphabets are 0, 1, 2, 3, 4, 5, and 6.
So a digit is full when it is 6.
The sequence begins with 0, and the entries increase by 1.
Therefore, the sequence may proceed the way as follows.

0, 1, 2, **3**, **4**, 5, **6**, 10, **11**, **12**, **13**, **14**, **15**, **16**, **20**, 21 . . .

Suggestions or Solutions
To the Problem 5

4, 5, 6, _, _, _, _, 14, _, _, _, 21, 22, 23, _, _, _, _, _, _, 33, _, _, _, _, _, 42, 43, 44, _, _, _, _, _, 53, 54, 55, _, _, _, 62, 63, 64, _, _, _, _, _, _, _, 105, _, _, _, _, _, 114, 115, _, _ . . . 53553, _, _, _, _, 53561 . . . _, _, _, _, _, _, _, _, 10000000, _ . . .

The radix is 7, since the alphabets are 0, 1, 2, 3, 4, 5, and 6. So a digit is full when it is 6. The entries increase by 1. Thus, the sequence may proceed the way as follows.

4, 5, 6, **10, 11, 12, 13**, 14, **15, 16, 20**, 21, 22, 23, **24, 25, 26, 30, 31, 32**, 33, **34, 35, 36, 40, 41**, 42, 43, 44, **45, 46, 50, 51, 52**, 53, 54, 55, **56, 60, 61**, 62, 63, 64, **65, 66, 100, 101, 102, 103, 104**, 105, **106, 110, 111, 112, 113**, 114, 115, **116, 120**, . . . 53553, **53554, 53555, 53556, 53560**, 53561 . . . **6666656, 6666660, 6666661, 6666662, 6666663, 6666664, 6666665, 6666666**, 10000000, **10000001** . . .

Suggestions or Solutions

To the Problem 6

-2110, _, _, _, -2100, _, _, _, _, -2023 . . . -101, _, -33, _, _, _, _, _, -21, -20, _, _, _, _, -3, _, _, _, _, _, _, 10, 11, _, _, _, _, 22, _, 30 . . . _, _, _, 200, _, _, _, _, _, 212 . . .

The radix is 4, since the alphabets are 0, 1, 2, and 3. So a digit is full when it has 3. The sequence begins with -2110, and the entries increase by 1. A negative number gets larger as its magnitude gets smaller. Thus, the sequence may proceed the way as follows.

-2110, **-2103**, **-2102**, **-2101**, -2100, **-2033**, **-2032**, **-2031**, **-2030**, -2023 . . . -101, **-100**, -33, **-32**, **-31**, **-30**, **-23**, **-22**, -21, -20, **-13**, **-12**, **-11**, **-10**, -3, **-2**, **-1**, **0**, **1**, **2**, **3**, 10, 11,**12**, **13**, **20**, **21**, 22, **23**, 30 . . . **131**, **132**, **133**, 200, **201**, **202**, **203**, **210**, **211**, 212 . . .

Suggestions or Solutions
To the Problem 7

5, 6, 7, 8, 9, _, B, _, 10, 11, 12, … _, 1C, _, 21, 22 . . . 9ABB, 9ABC, 9AC0, 9AC1, 9AC2 . . . CCABC, _, _ . . . _, _, _, CCCC01 . . . _, _, _, _, _, _, 1000001 . . .

The alphabets are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, and C.
A is worth 10, B is worth 11, and C is worth 12 in decimal.
So the entries are on the base 13, and a digit is full if it is C.
The entries increase by 1. We are not used to number systems other than decimal. So for the convenience, setting A = 10, B = 11, and C = 12 on the side, and referring to the list, we can see the sequence proceeds the way as follows.

5, 6, 7, 8, 9, **A**, B, **C**, 10, 11, 12 . . . **1B**, 1C, **20**, 21, 22 . . . 9ABB, 9ABC, 9AC0, 9AC1, 9AC2 . . . CCABC, **CCAC0, CCAC1** . . . **CCCBCB, CCCBCC, CCCC00**, CCCC01 . . . **CCCCC8, CCCCC9, CCCCCA, CCCCCB, CCCCCC, 1000000**, 1000001 . . .

Suggestions or Solutions
To the Problem 8

15, 16, 17, _, _, _, 22, 23 . . . 2737, _, _, _, 2742 . . . 6428, _ . . . _, _, _, 10001 . . . _, _, _, _, 810001 . . .

The alphabets are 0, 1, 2, 3, 4, 5, 6, 7, and 8. So the entries are on the base 9, since we use 9 alphabets to make entries. Thus, a digit is full when it is 8. And the entries increase by 1. So the sequence proceeds the way as follows.

15, 16, 17, **18, 20, 21**, 22, 23 . . . 2737, **2738, 2740, 2741**, 2742 . . . 6428, **6430** . . . **8887, 8888, 10000**, 10001 . . . **808886, 808887, 808888, 810000**, 810001 . . .

Suggestions or Solutions
To the Problem 9

59ADCE, 59ADCF, _, _, _, 59ADD3, 59ADD4 . . . FACDAE, _, FACDB0, _, FACDB2 . . . 100009E, _, _, _, . . . _, _, _, _, 100000A2 . . .

The alphabets are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. So a digit is full when it is F (worth fifteen of 1s).
Of course, we don't see 6, 7, and 8. Working in math, we may want to make a logical guess and see if it works.
The entries increase by 1. Thus, the sequence proceeds the way as follows.

59ADCE, 59ADCF, **59ADD0, 59ADD1, 59ADD2**, 59ADD3, 59ADD4 . . . FACDAE, **FACDAF**, FACDB0, **FACDB1**, FACDB2 . . . 100009E, **100009F, 10000A0, 10000A1** . . . **1000009E, 1000009F, 100000A0, 100000A1**, 100000A2 . . .

Suggestions or Solutions
To the Problem A

-DG00, _, _, _, _, _, _, _, -DFG9, -DFG8 . . . _, _, _, _, _, -3A88 . . . -2000, _, _ . . . AFDE, AFDF, _, AFE0, AFE1 . . . FEFE, FEFF, _, _, _, FEG2 . . . GF9E, _, GF9G, _, _, GFA2 . . . GGFF, _, _, _ . . . GGGE, _, _, _ . . . _, _, _, _, B000001 . . .

The alphabets are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, and G. So a digit is full when it is G (worth sixteen of 1s). Of course, we don't see many of the alphabets. When we work in math, we need to make a logical guess and see if it works. In other words, we should be able to make a guess with reasoning and see if it makes sense.
The entries increase by 1. Not quite used to the alphabets? Then, put aside the decimal equivalence to A through F. So set A = 10, B = 11, C = 12, D = 13, E = 14, F = 15, and G = 16. Note that a negative number gets smaller when its magnitude gets larger.

Thus, the sequence proceeds the way as follows.

-DG00, **-DFGG**, **-DFGF**, **-DFGE**, **-DFGD**, **-DFGC**, **-DFGB**,

-DFGA, -DFG9, -DFG8 . . . **-3A8D**, **-3A8C**, **-3A8B**, **-3A8A**,

-3A89, -3A88 . . . -2000, **-1GGG**, **-1GGF** . . . AFDE, AFDF,

AFDG, AFE0, AFE1 . . . FEFE, FEFF, **FEFG, FEG0, FEG1**,

FEG2 . . . GF9E, **FG9F**, GF9G, **GFA0, GFA1**, GFA2 . . .

GGFF, **GGFG, GGG0, GGG1** . . . GGGE, **GGGF, GGGG,**

10000 . . . **AGGGGGE, AGGGGGF**, **AGGGGGG**, **B000000**,

B000001 . . .