

OA Summary

2-minute Quick Response Section: 10

Math Section: word problems/tricky "math riddles"

Writing Section/ Logic Section: ask you to correct grammar mistakes, analogies and puzzles.

Programming and Learning: each you some basic concepts of a language and you answer questions based on their mini-lessons/examples, and extra 4 coding.

(对于语言学习题建议做题时把前面的规则写在纸上，方便做题)

(Epic OA 以为可以随时开始...结果必须先约好，当时等了一个多小时。)

(要细心，说了半屏的 **string**，考的却是 **number**，比较绕，要淡定才能搞清楚它定义的规则)

(在开始做之前把网上的面经都看下，基本上所有的题都能在网上找到。)

Learning:

1. MIIS: 很仔细，做完还检查了一遍，花了 1 个小时，记住等式是严格从左到右计算的 ($1+2*3=9$), "" 和 null 是等价 (有一道题考到), S 和 R 用来 allocate, (S J = 1, N=10), K 用来 free, (K J)。
 - a. 表达式运算严格**从左到右**
Given an expression like $3*4+8-9$ (only +, -, * operators) as a string evaluate it strictly from left to right
 - b. 整数与非整数的运算: 取**最前连续**的整数位, 比如, $1A2B = 1$, $1.A3$, $1.3ABC$ 什么的都是 1, $A45 = 0$, $-1.2 = -1$, null = 0
 - c. False 可以用 "" 表示
 - d. 有'与或非'运算, 分别是 & ! ' , "" 与字母或数字结合就是 0, 'A = 0, '1A = 0, ' 1 = 0; (' means not. It converts a character **to null in a string** but converts the character **to 0 in an operation**
1=John, 2=Jane, 3=Does, ""123"=? , Jane3Does was the closest answer. It seemed wrong because of the 3 in there.)
('5 means null whereas '5+1=1, which one of these is true? Cannot recall the options; they all appeared false. I put the last option, but couldn't figure it out. ('5)=0?)
 - e. True 表示为 rubout, False 表示为 null 或 "".
 - f. % 的运算符变成 #, 其他不变
(Several problems used the # symbol defined as the remainder $4/3=1$, one question asked $\frac{3}{4}$ another $\frac{1}{2}$ and another had 0/0, you had to know not only modulo but whether it is usable for a normal fraction)
 - g. 有 R, S, K 三种输入符
R 读的是字符串
S 可以自己设值, S a="1" a=1 就是分别设置 string 或 int
K kill K 什么不加表示清掉所有字符, 就是所有定义的字符都被释放掉了
K() 就是清除除了括号里的所有字符
K a 就是清除 a
(Holy water is concatenated by "Holy". "Water" or "Holy". "Water" Watch the space, How would you spell "Holy Water" given "Holy"=God and HOH="Water". (1)God.HOH (2)God."" .HOH (3)God"."HOH (4)Forgot others.)

Math:

1. Note: Dime(10 cents)
2. How many minutes is it before 6pm, when 30 minutes ago, it is 4 times the amount of time after 4pm: ~~72~~ 66
(How many minutes before 5pm is it if 30 mins ago it was four times as many minutes after 3pm: ~~48~~ 66)





(How many minutes before 5:00 PM would it be if 50 minutes ago, it was four times as many minutes since 3 PM: ~~46~~)



(现在距离五点的时间是 50min 之前距离 3 点时间的 4 倍，问现在距离五点有多少 min)

3. 2.5 人砍 2.5 棵树 2.5 天内 问 10 人 5 天砍多少?

4. 6, -18, 72, -360 ~~2160~~ -1 2 -6 24 -120 ~~720~~?

Programming (<http://blog.csdn.net/lsdtc1225/article/details/39949367>)

1. **Anagram

Enumerate all possible anagrams of a random string where capital letters, numbers, and symbols are not allowed to move within the string.

(Version1. anagrams 输入一个 String, 1.大写字母不能变小写 2.大写字母或者其他字符位置不变 3.不能有数字 0-9. 4. 根据小写字符输出 anagrams.)

(Version2. Anagrams 有四个原则: 1、Character case 不能变 (A 不能变 a)。2、只有小写能移动 (大写和特殊符号不能动位置)。3、数字是非法输入。4、忘了。。 总之最后输出所有满足条件的 anagrams。)

(Version3. 不能输入数字 (这个要 validate input), 然后字母和其他符号位置不变, permute 写字母)

(Version4. Anagram 的题, 要求大写字母不用动, 还有就是数字是 invalid input。。。)

(Given a string. symbols, capital letter and numbers cannot move, print all anagrams.)

(Related) **Permutation

Get a string (word) from user, then make every possible permutation words. Ex. Input: tree

Output: tree, rett, rete, reet, etre, eetr, eert, eter, eret, teer, reet...

(Given a password in number: write an algorithm to print all possible combinations of that password.

Hint: try from to go from all possible combinations of lower bound to the valid upper bounds.)

2. ***Colorful Number II

If given a number find a number if it is colorful. A number is said to be colorful if all its possible unique permutations multiplication result different. EX. If n=1234 then permutations are (1,2),(1,3),(1,4),(2,3),(2,4),(3,4),(1,2,3),(1,2,4),(2,3,4). That's it, no other combination and if any of them repeats then number is not colorful.

(Find if given set of elements 2, 4, 3 form a colorful number?)

3. ***Cards Play

54 张牌, 每张牌上 1-9, A-E 各一个数字 + 一个 Letter, 比如 3D, 4F, 5A, 7C; 有一个 string 输入, 写一个 program 每次读 4 张牌, 1 到 4, 如果发现 1 和 4 letter 一样, 丢弃中间 2 张, 在重新读 1 号位置到 4 号 4 张牌, 如果 1 和 4, number 一样, 4 张全部不要, 如果又没有 number 一样, 也没有 letter 一样, 读 2 到 5 号新的 4 张牌, 再比较 first card 和 last card, 做同样的事情, 最后如果全部扔掉, print You Win, 如果手里还剩牌, print You lose 和牌的个数; 如果数字相同就全部丢掉, 如果数字不同, 比较字母; 如果字母相同, 丢中间的 2 张; 如果字母数字全部不同, index 到 2 3 4 5 张 card; 做一样的事情; 但是只要丢牌 index 就重新开始 1,2,3,4;

(有一副牌, 牌的名字是“4D”“8A”这种, 如果第 1 张和第 4 张的数字一样的话, 就消掉第 1, 2, 3, 4 张牌, 然后接着比较剩下的牌的第 1 张和第 4 张。如果字母一样的话就消掉第 2, 3 张牌, 然后比较剩下的牌的第 1 张和第 4 张。如果第 1 张和第 4 张牌的数字和字母都不一样的话, 就比较第 2 张和第 5 张。一直做下去, 如果有剩下的牌就输, 否则就赢。)

(每一张牌都是由数字和字母组成的。比如“4D”, “8E”

给你一些牌, 每次按顺序取四张。

第一次抽第一张到第四张

如果第一张和第四张的字母相同，则去掉中间的两张（第二张和第三张）。

如果第一张和第四张的数字相同，则四张都去掉。

如果字母和数字都不相同，则抽第二张到第五张。

如果最后不剩牌了，则显示赢了，如果还有牌，则输)

(纸牌题。有 54 张牌，牌面是数字加字母。如“1A, 2B, 3C, 4D, 5F, 6B, 7D”。规则是，从左向右，四个为一组，这四个中，如果第一个和最后一个的数字相同，那么这四张牌都消掉，如果是字母相同的话中间两张消掉。每次发生消除的话都要从头开始。如果没有发生消除就看下一个 4 张牌，例如“1A, 2B, 3C, 4D”没有消除，就看“2B, 3C, 4D, 5F”以此类推，每次发生消除了就从现有的牌的第一张开始。输出，如果牌都消完了，print “You win” else print “You lose” and number of remained cards.)

(Related) *Reduction:

(输入一个 numeric string，逐步去除里面重复的数字，直至做到没有重复为止。Ex: 1000034435 -> 1335 -> 15)

(第一道是给一个 String，要求写个函数消掉 String 中连续重复的字符。要求最终的 String 里不能有连续相同的字符。比如 abbac, 先消掉 bb,再消掉 aa,最后应该返回 c)

(去重复 100444555 之类)

4. ***Word Search II (where's waldorf)

Find the presence of a given word in a given grid, word can be matched in any direction up-down, down-up, left-right, right-left, both diagonals up and down etc.

(Word Search，要找八个方向，与 leetcode 原题相似)

(给一个 matrix，每个 grid 里面是一个 letter，然后给一个 word，找这个 word 是不是在这个 matrix 里面，如果找到就打印坐标，8 个方向都要找)

<http://www.careercup.com/question?id=13126665>

5. **Char Frequency

字母频率并且按照出现顺序打印，还是挺简单的 先用 hashmap 统计频率 再用 hashset 确定打印按照出现顺序。

(数 string 里每个 character 的出现次数，按出现顺序打出来.)

(找出一个字符串中的每个单词的首字母出现的次数，然后按顺序输出 ex. "My mom is a teacher" "a:1 i:1 m:2 t:1" 大概就是这个意思)

(Common character, 把一个 string 里面的最高频的字符和最低频的字符互换。)

6. *** (换汤不换药的“新题”们) There are 2 roommates. Each one prepares a list for grocery store. Make a combined list without any duplicates.

(两个排序数组去除重复输出。。。这个题很蛋疼，描述了一堆乱七八糟的东西，读了好几遍题才明白意思。)

(Cheater: given 2 sorted arrays, each of them only contains 7 elements, each element is a digit number (0-9). combine them, remove duplicate, return a new sorted array.(不太懂为什么这道题叫 cheater))

(第一题是新题，考前楼主才在面经贴里看到，这里直接引用那位同学的帖子里的原话，我找不到原帖了==“大概就是有一个游戏，两个入口，每个人进入入口的 id 是自己的手机号，只能投一个入口，有些人在两个入口都投了自己的手机号，返回一个 list，包含两个如果所有的不重复的手机号，并且是排序的，输入是两个 array，没说手机号的形式，我用的是 string”。补充点细节就是这两个入口的 list 都是 sorted，所以楼主直接就把手机号当作 int 做了，就是先要删除重复的手机号，然后再 combine 在一起)

7. *Number Triangle

Given an array {{4,7,3,6,7}}

Construct a triangle like

{{81}}

{{40, 41}}
{{21, 19, 22}}
{{11, 10, 9, 13}}
{{4, 7, 3, 6, 7}}

(给定一组数 ex. 5, 6, 23, 45, 返回:

5, 6, 23, 45

11, 29, 68

40, 97

137)

8. *Alpha and Arabic: 每个字母对应一个数字。输入一串字母, 当出现某个字母比后面那个小, 则前面的运算要变成减法再与后面的相加。ex. CAB: $-14 -1 + 4 = -11$ CBA: $14 + 4 + 1 = 16$
(计算一串字母的值, 给一个值表 A-1 B-13 C-110 ... 然后计算给定串的值, 右边串有大于当前的就算负数, 大于就算正数 ex. CBA $110 + 13 + 1 = 124$ ABC $-1 - 13 + 110 = 96$)

9. typing finger 的题, 十根手指分别对应不同字母那道题
(每个手指代表几个字母, 然后 input 几个手指, 求所有排列。)

Related: Keypad Permutations

10. *火星上一年有 12 个月, 除了二月, 其他月份都是 31 天。二月在 leap year 的时候是 30 天, 不是 leap year 的时候是 29 天。leap year 的判断标准是年数可以被 4 整除, 但是如果年数能被 200 整除, 但不能被 1000 整除的年不是 leap year, 比如 1400 不是 leap year, 但 2000 是 leap year。现在给定一个日期 (mm/dd/yy), 判断该日期是否合法, 然后给出在这个日期以后的下一个 leap day, 即 02/30/xx。 MarsCalender
(12 个月, 每月都是 30 天, 只有 Leap year 的 2 月份是 31 天。给你一个 date, 输出下一个 Leap day.)

(有个特殊的星球一年 12 个月, 每月 30 天, 闰年 2 月 31 天, 闰年的条件是能除尽 200, 但是不能除尽 400 的, 除非能同时除尽 1000。问题是输入字符串“MM/DD/YYYY”判断 valid 不)

Calendar II (Related)

(If jan 1 2011 is Tuesday then what will be the name of the day for march 6 2064 and print that.)

(Find no. of days between Jan 1st and entered date)

Write a program to generate all palindrome dates by taking the beginning and ending dates as an input from the user. The format of the date is given as MMDDYYYY.

(Palindrome date: a date is said to be a palindrome when it is expressed in MMDDYYYY format, it reads the same both ways. Given 2 years as input (ex. 2000, 2010), print out all the dates which are palindrome dates.)

(Given a year, print the calendar (all dates).)

(Convert date from mmddyy to words)

11. *Text shift. 把一段话从 horizontal 的形式输出称为 vertical 形式。

Given a horizontal array of strings convert it to vertical. Like English characters are read left to right. Convert them to Chinese format which is read vertically.

Ex.

Epic is a healthcare Company.

Interviewing for software developer.

Print this vertically sentence by sentence.

12. *你有三种篮子能装, 6, 9, 20。给你一个数 N, 找出所有正好装完 N 的组合 Fill Basket

13. *Jump Chess II

N*N matrix, find the longest ways for each players.

Players: red and blue.

Players can jump to the next position based on the opposite player, after jump, remove the opposite player.

(jump game 一个 matrix 上面存 0,1,2. 0 代表 empty, 1 代表 player 1 占据了格子, 2 代表 player。jump 的规则是只能 horizontal 或者 vertical, 相邻的必须是对方的棋子, 跳到对方棋子的另一边, 跳的落点必须是空。例子:

```
0 1 0 1 1
0 2 0 0 2
0 0 1 0 2
0 0 0 0 0
```

m[0][1]出发的话 只能超下跳一步, 然后 m[2][1]被 1 占据。最后要找出最长的 path 的 length。) (Related) *Jump Chess

14. **AEIOU (Gibberize String)

Taking string as an input from user. After taking, consider A,a,e,E,i,l,o,O,u,U, if these letters appear in the string... then replace them with A^, a^, e^, E^, i^, l^, o^, O^, u^, U^ . Leave the first three eligible letters from the starting of the string.

(Embedded Password:

给一个 string 都是字母, 选出符合条件的字母串;

a. 每次读 N, 2N, 3N, 4N 位置上的字母, 直到 N^2;

b. 每个符合条件的字母 at least 3 元音字母.

c. 如果 odd length, 中间那个必需是元音

如果 even length, 中间 2 个必需是 same 元音, 而且同时 uppercase or lowercase

d. 每个字符串 first, last 必需 uppercase)

(新题: Assonance. 大意是把一个 String 里所有元音开头的单词放到一起, 其他单词顺序不变。比如输入时"my apple has another enough work soccer engineer", 输出就是"my apple another has enough engineer work soccer", 把所有 a 开头的放到第一个 a 开头的后面, e/i/o/u 也一样, 其他单词按照原先后顺序排列。简单的一点是默认输入只有字母和空格, split 一下很容易地。)

(从一个 String 里面取出 index 为 1N, 2N, 3N ... N*N 的字符, 组成密码, 有几个限制条件,

a. 第一个和最后一个字母是大写,

b. 至少三个 vowel, 不区分大小写,

c. 如果组成的密码是 odd, 中间那个字母必须为 vowel,

d. 如果是偶数, 中间两个为 vowel。最后打印出符合条件的字符串。例如

zzzAEzzazPzazziWzzzCzzzzAzz, if N=4, 输出为 AaaW, N=5, 输出为 EPICA)

(以前没见过但是不难。给一串, 按照特定的规则从里面取出字符组成字符串, 规则是: index 为 N, 1N, 2N, N*N (N 从 4 开始) 的字符取出组成字符串, 组成的这个字符串还需要符合一定的规则: 1. 第一个和最后一个字符是大写字母。2. 最少要有 3 个元音字母, 不分大小写。3 如果所组成字符串长度是奇数, 那么中间那个字母必须是元音。4. 如果长度是偶数, 中间两个必须是相同的元音。如果满足上述条件打印出来。输出打印在所给字符串中所有符合条件的组成的字符串。例如: zzzAEzzazPzazzlwzzzCzzzzAzz, N 可以等于 4 (AaaW) 也可以等于 5(EPICA), 但是不能等于 6 了, 因为字符串没有 6*6 那么长)

15. *Tic tac toe II

N*N matrix, two users: X and O. If 3 respective marks together (no matter: vertical, horizontal, diagonal) will win 1 point; for user X, 6 respective marks together will win 3 points; For user O, 8 respective marks together will win 6 points, check who win.

(*Tic Tac Tree)

16. Free Piece

大概说是你和朋友下棋, 你碰掉了一个棋子, 俩人都不知道原来放哪的, 朋友说你可以随便摆回去。输入一个二维矩阵, 0 表示空位, 1 表示自己的棋子, 2 表示对手的。然后棋子吃子的原则

是能横着或竖着走，不能对角线，不能跨棋子，碰到对手就能“capture”。问找一个点能“capture”最多对手棋子的点。 ???

(related: Snake Sequence)

(N*N matrix, find the longest ways for each players. Players: Red and Blue. Players can jump to the next position based on the opposite player, after jump, remove the opposite player.)

17. 给一串数字，和一个 int 数组，根据数组的值来拆分这串数字，然后用连字符“-” reverse 拼接起来， 例子：1234567890 [3,4,2,1] 输出是 890-4567-23-1 **SplitNumber**

18. Broken Number: 得到两个数，把第一个数拆成两个数，两个数和跟第二个数的差最小的给打印出来。但是两个数的和必须小于第二个数。Ex. 第一个数是 10958 第二个数是 1000， $10 + 958 = 968$ 这个就可以，但是 $1095 + 8 = 1103$ 就不可以了。

19. (Similar Fibonacci Number)

Given start and end integer as user input, generate all integers with the following property.

Example:

123, $1+2=3$, valid number

121224, $12+12=24$, valid number

1235 $1+2=3$, $2+3=5$, valid

125 $1+2<5$, invalid

20. Snake Game II

Find longest increasing sub sequence in 2d array.

Finding length of snake in snake game

The sequence must not be diagonally. (top-bottom, bottom-left-top...)

Increasing means one step

Ex:

10, 11, 12, 13 (correct)

12, 14, 15, 20 (wrong)

Ex. Consider 4*4 grid

2 3 4 5

4 5 10 11

20 6 9 12

6 7 8 40

Output: 4 5 6 7 8 9 10 11 12

21. *(Version 2 Seed Num) seed 这种题一般都是可以缩小解的范围, 比如 seed multiply 解一定是 \sqrt{N} 到 $N/2$ 之间的因数 ($N>4$)

至于本题的 seed sum, 可以这么来分析

假设 $N = \text{seed} + \text{seedSum}$, seedSum 是 seed 各个位上的数字之和 (比如 $2+4+5$)

那么 seedSum 是有范围的 比如三位数 $\text{seedSum} \leq 9+9+9=27$

以 $N=256$ 为例, $\text{seedSum} \leq 27$, 而 $\text{seed} = N - \text{seedSum}$ 也就是说 $\text{seed} \geq 256-27=229$

也就是说 229 以下的数就不用考虑了 因为不可能达到 256

int 最多只有 10 位 也就是说我们可以把 iteration 次数控制在 90 以内

差不多就是这个思路。。欢迎指正

22. 以前看面经的时候没遇到诶， 题干还特别长。。。大意是酱紫的：现在捏，有一种传染病，可以通过人和人的接触传播，而且被传染的人又将成为新的传染源。XX 公司举办了个见面会，邀请了一些人来参加，这个见面会有个很别(you)致(bing)的规则 - 每个回合，你只能选择 a 和一个人交流, b 谁也不理， 回合结束后会有统一的信号 (比如响个铃什么的)，之后开始下一回合。会有人记录下来每个人每回合都做了什么选择，统计成了一个 matrix， 给定一开始的传染源是参与者 Y， 要求输出见面会结束后，都有谁被传染了。多说一句，原题对于这个 matrix 的描述真是太绕了。。 它想表达的是， 这个 matrix 每一行代表的是每个人， 每一列代表的是每个回

$$\begin{bmatrix} 3 & 4 & -1 & -1 & -1 \\ -1 & 3 & 3 & -1 & 4 \\ 1 & 2 & 2 & 4 & -1 \\ -1 & 1 & -1 & 3 & 2 \end{bmatrix}$$

ROUND 4 2 - 4 (传染给 4)

[illegible]

23. Multiplicative iteration. Assume letters are A=1, B=2... The number N=4 then A=1*4=4. If result is greater than 26 then mod 26. Input a string and give an encrypted result as output.
24. Write a function which takes an input for a double dimensional matrix. Each page is 1000 pixels wide and 1000 pixels high. A black pixel is represented by 1 and a white pixel by 0. Return an answer set of array of row numbers for appropriate page breaks. A page break would ideally be a row with all white pixels. If the page break is encountered more 1000 rows from the last break then the page break should be forcefully taken 1000 rows from the last break.
25. We have 'n' patient and 'm' problems. The problems are of Boolean type. Ex. Diabetes problem would be 'T' if a patient has it or 'F' otherwise. Suggest the data structure you would store this scenario on?
Q: we have a set of problems {diabetes, liver disease, kidney disease} find all the patients who have at least the 3 problems from the set.
The number of patients can be huge (n).
The number of problems not comparatively huge (m).
Which would be the best data structure to store these kind of records, so that we have a better search time.
26. Given a 2 dimensional point of a rectangle and its area, find permutations of all the other 3 points of rectangle in 2D space
Ex.
Given (0, 0)
Solution (0, 1), (1, 0), (1, 1)...
27. Glitch is a walking robot moves in a peculiar problem: it takes x steps forward, then x+1 steps backward, then 2x steps forward, x+2 steps backward, 3x steps forward x+3 steps backward, and so on... until it has taken by steps, glitch turns 180 degrees before continuing with its pattern. Write a program that prompts x and y and total number of steps taken and outputs how many steps away from its starting point.
28. In a company, there are 3 categories A, B, C. they want to give an increment. So if Category C gets N% as increment. Category B gets 2N% as increment and category A gets 3N% as increment. But the increment should be at least 1% and the total updates salary should not exceed \$50,000.
Print the increment and the total updated salary for a particular employee.
Assume all the required variables.
29. Write a software to print triangle made of *s. Given the height and width of Triangles in terms of number of stars. Like to output:
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Given u have to use 3 stars or the height is 3 stars.

30. Given a number, check whether it is equal to its sum of its factors or not (excluding the number itself).
31. Write a random number generator that takes as an argument number n and returns the random number between 0 and n, any use of library random function is forbidden.
32. Convert Binary Tree to Binary Search Tree
33. Please write a function that accepts a floating number and returns its square root. You may not use built-in square root function from your language. However, basic operators like addition, subtraction, multiplication are allowed. Please take into consideration the floating precision.
34. Convert String into new string ex. "abcD" -> "cdeF" and "plxY" -> "rnzA";
35. 3-sum closest