

TCS Digital Test

Sample Questions

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Sample Question

The words **Ocean** and **Cube** can be related through a set of words/phrases in a specific order (path) as below:

Ocean, Water, Ice, Ice cube, Cube

In a similar way, relate **Alert** and **Timeline**.

- The score increases if you can relate them in more than one way.
- A shorter path gets higher score than a longer path.
- Use new-line between paths. Use comma between phrases in a path.

Group the following 16 pictures into 3 categories of 4 pictures each. The purpose of the remaining 4 pictures is to mislead you.

As a clue to solve the problem, the first 2 pictures in each of the first 3 columns are placed for you.

 Mahatma Gandhi			
 John F. Kennedy			 Indira Gandhi
		 Jawaharlal Nehru	 Abraham Lincoln
		 Donald Trump	

Given the picture



one may visualise a pencil or a tower or a rocket and so on.

What comes to your mind when you see the following picture? The more answers you give (that are suggested by the picture) the better.



The following note gives one part of a position paper on the future of Life Science. Please read the passage, and identify which of the indicated technologies would be useful for these trends **strictly based on the passage**. Note that more than one technology may be applicable

Life sciences companies are focusing on keeping patients digitally informed with accurate medical information on diseases, related drugs, and devices through microsites, mobile apps, and informative videos. Rather than replacing healthcare providers (HCPs), the digital medium will complement the quality of healthcare available for patients. Platforms or patient healthcare portals such as ChARM PHR help users manage not just their personal health records and medication history but also care plans, immunization records, health and wellness tips, and so on. patients like me and other such patient networking portals connect people with similar medical conditions and help them better understand medication regime, side effects, and cost impact, among others.

In such patient networks, some members are key influencers or 'digital opinion leaders'. Life sciences companies can collaborate with these community leaders to share their opinions and information related to new therapies, trials, and care methods with others. Social networking sites can also provide information on specific campaigns to access drug vouchers, coupons, health-tips, and so on. Companies are leveraging social media channels by creating community pages for disease condition information well within the required compliance and regulation. Unimetric's report on pharma-social-media-trends states that most of the pharmaceutical companies are active on five out of six social networks with the majority preferring Twitter, LinkedIn, Facebook and YouTube. MerckEngage is one such

communication channel available across social media.

Digital technologies are now being leveraged to reduce medication non-adherence too with mobile-based trackers and schedulers, sensor-based devices such as inhalers, smart pillbox, and smart pills. Sensor-enabled medical devices such as oximeter and blood glucose monitor are capturing vital health stats for patients using their smartphones. These are transmitted to physicians and care teams, who provide patient-specific recommendations.

Possible Technologies

IOT, connected cars, Nudging, social media, distributed databases, non-relational databases, visualization, chatbots, semantic nets, Deep Learning, neural networks, speech technologies, behavioral analytics, cloud computing, Hadoop, mobile technologies, gesture detection, collaborative technologies, knowledge engineering, speech technologies, language translation, simulation

In a singly linked list, each node has a pointer to the next node in the list. The last node points to nothing.

Eesha wrote an **iterative** function that takes the first node of a singly linked list as argument, reverses the list, and returns the first node from the resulting list.

However, she did not get the correct result. The pseudo code for this function is given below. In which line number has she made a mistake? (fill in the blank)

1	<code>public Node reverse(Node x)</code>
2	<code>{</code>
3	<code> Node first = x;</code>
4	<code> Node reverse = x.next;</code>
5	<code> while (first != null)</code>
6	<code> {</code>
7	<code> Node second = first.next;</code>
8	<code> first.next = reverse;</code>
9	<code> reverse = first;</code>
10	<code> first = second;</code>
11	<code> }</code>
12	<code> return reverse;</code>
13	<code>}</code>

Please Choose one of the choices A,B,C or D

Each of Alia, Betty, Carol, and Dalia took a test. Each of them answered at least one question correctly, and altogether they answered 67 questions correctly. Alia had more correct answers than anyone else. Betty and Carol together answered 43 questions correctly. How many correct answers did Dalia have?

A) 1 B) 2 C) 3 D) 5

Computer vision is a branch of computer science aims to enable computers to recognise and process images in a way that human vision does. It is similar to imparting intelligence and instincts that humans possess into a computer. Computer vision is closely related to artificial intelligence, as the computer must interpret and discern what it sees, perform the required analysis and provide insights for decision making; e.g., computer vision for driverless cars perform functions such object detection (road, traffic lights, pedestrians etc.), motion & speed detection, path prediction. Obviously this needs to be done real time and across all the entities in the ecosystem, so there is a huge amount of data to process in a very short time.

Deep learning is a popular set of methods used to achieve this. Scientists collect sizeable sets of data and use it in part to train the computer vision algorithm and in part to test the algorithm. Subsequently they build the 'decision-making' capability based on the algorithm's outputs, e.g., intelligence added to stop the car once a pedestrian is detected crossing the road in front.

As a computer vision expert, you have recently attended the World Ophthalmic Federation summit, where a proposal has been tabled to develop 'Nethra'- computer vision-enabled goggles for visually impaired. The federation has collected a dataset of 1,000,000 images taken from various head-mounted cameras simulating the typical paths of visually impaired pedestrians in New York City. Some images have multiple objects in front, other images do not, some are. Arrange the items below in order of what you would do to build the solution:

- a. Scale the object localization to support multiple objects
- b. Validate the accuracy of the model using the test data
- c. Build an image classifier that detects different types of objects
- d. Split the Data into a training and test set with ratio 70:30
- e. Build an object localization mechanism

Pattern recognizer

It is very well known that a number of languages support a regular expression recognizer, that is, given a regular expression, one can say whether an input string matches it.

The Pattern recognition company has created a new language (PATREC) that will recognize more patterns. For example, it can recognize all strings IAMSAD IAMAMSADSAD IAMAMAMSADSADSAD (the number of repetitions of AM is the same as the number of repetitions of SAD, and there is at least one AM).

The language has two types of classes defined, patterns and strings. In the initial prototype, they have predefined 10 objects of the pattern class (\$P0, \$P1, \$P2,... \$P9) and 5 variables of the string class (\$S0, \$S1... \$S4). String literals are allowed, by enclosing them in quotes. THUS, "AM" is the string.

All the predefined objects are Null to start with.

Patterns are constructed from strings and other patterns. Three methods are provided for the pattern class viz. CONCAT, ALTER and RECOG.

CONCAT method accepts any number of patterns, strings or literals as parameters, and creates a pattern that recognizes the corresponding set of strings. Hence, after executing the following set of instructions,

```
$P0=Pattern.CONCAT("SAD")
```

```
$P1=Pattern.CONCAT("IAM",$P0)
```

\$P1 will be a pattern that recognizes "IAMSAD". The **RECOG** method maybe used to test. \$P1.RECOG("IAMSAD") will return TRUE.

ALTER method accepts precisely two strings or patterns (or any combination of these) that gets the pattern to recognize one of the two parameters.

If after the execution of the above two statements, we say

```
$P2=Pattern.ALTER($P1,$P0)
```

then \$P2 will recognize "IAMSAD" and "SAD". \$P2.RECOG("IAMSAD") and \$P2.RECOG("SAD") will both be TRUE.

Presence of a pattern variable on both LHS and RHS implies a recursive definition of the pattern variable. So, for example,

```
$P3=Pattern.ALTER("AMSAD", Pattern.CONCAT($P3, "AMSAD"))
```

means \$P3 is defined as \$P3 followed by "AMSAD" and effectively it will recognize "AMSAD", "AMSADAMSAD", "AMSADAMSADAMSAD" and so on.

You need to write a set of statements in PATREC so that \$P0 recognizes only the following strings

IAMVERYHAPPYNOW
IAMAMVERYHAPPYHAPPYNOW
IAMAMAMVERYHAPPYHAPPYHAPPYNOW
And so on (the number of AM is equal to the number of HAPPY)

You need to write a program to accept input in the format specified, and produce output as specified. The program will be run against a number of test cases (2 public, given as examples, and the others private (which will not be known to you)). The performance of the program (correctness of output and time taken to execute) against the test cases will be used to evaluate.

Max Square Sum

Given a square array of size $N \times N$ where each cell is filled with a number between -9 and 9. A sub square of size k is any set of k contiguous columns and k contiguous rows. For any sub square, the sum of elements in its cells is called a sub square sum. Given the $N \times N$ square, write a program to find the maximum sub square sum. Note that a 1×1 square ($k=1$) is not considered a sub square)

Input

N , giving the size of the square

The next N rows each contain N space separated integers giving the values of the cells in the rows of the square, left to right

Output

One integer, the maximum sub square sum

Constraints

$N \leq 1000$

Example 1

Input

```
4
2 -8 4 -6
7 1 -5 3
-9 7 6 5
8 3 2 -4
```

Output

20

Explanation

The 2 by 2 square sums are

2 -8 -4

6 9 9

9 18 9

The 3 by 3 square sums are

5 7

20 18

And the 4 by 4 square sum is 16. Hence the maximum sub square sum is 20.

Example 2

Input

3

1 1 0

1 2 2

3 0 4

Output

14

Explanation

As all the entries are non-negative, the 3 by 3 sub square (which has a sum of 14) is the maximum