PHP Laravel Developer

Programming Skill Assessment Questions

This assessment contains 5 PHP related questions, and 3 SQL related questions.

You may use any tools at your disposal to complete these questions.

You should consider cases where different inputs other than that of the question for each of the questions, we expect different scenarios to be handled and the function will still working accordingly.

Usage of search engines and reference books for code references and syntax is allowed;
However, you are not allowed to search for the direct solution to the questions. You will be disqualified if you are found cheating (and believe me, we know).

Test Scope:
PHP, MySQL

QUESTION 1

A binary gap within a positive integer N is any maximal sequence of consecutive zeros that is surrounded by ones at both ends in the binary representation of N.

For example, number 9 has binary representation 1001 and contains a binary gap of length 2. The number 529 has binary representation 1000010001 and contains two binary gaps: one of length 4 and one of length 3. The number 20 has binary representation 10100 and contains one binary gap of length 1. The number 15 has binary representation 1111 and has no binary gaps.

Write a function:

function solution($N);
that, given a positive integer N, returns the length of its longest binary gap. The function should return 0 if N doesn't contain a binary gap.

For example, given N = 1041 the function should return 5, because N has binary representation 10000010001 and so its longest binary gap is of length 5.

Example 2: given N = 52, which has a binary representation of 110100, the longest binary gap will be 1.

QUESTION 2

A zero-indexed array A consisting of N different integers is given. The array contains integers in the range [1..(N + 1)], which means that exactly one element is missing.

Your goal is to find that missing element.

Write a function:

function solution($A);
that, given a zero-indexed array A, returns the value of the missing element.

For example, given array A such that:

A[0] = 2
A[1] = 3
A[2] = 1
A[3] = 5

the function should return 4, as it is the missing element.

Example 2: given array A such that A = [2,3], the function should return 1, as it is the missing element.

Assume that:

N is an integer within the range [0..100,000];
the elements of A are all distinct;
Each element of array A is an integer within the range [1..(N + 1)].
Array A can be empty.

QUESTION 3

A non-empty zero-indexed array A consisting of N integers is given. The array contains an odd number of elements, and each element of the array can be paired with another element that has the same value, except for one element that is left unpaired.

For example, in array A such that:

A[0] = 9 A[1] = 3 A[2] = 9
A[3] = 3 A[4] = 9 A[5] = 7
A[6] = 9

the elements at indexes 0 and 2 have value 9,
the elements at indexes 1 and 3 have value 3,
the elements at indexes 4 and 6 have value 9,
the element at index 5 has value 7 and is unpaired.

Write a function:

function solution($A);
that, given an array A consisting of N integers fulfilling the above conditions, returns the value of the unpaired element.

For example, given array A such that:

A[0] = 9 A[1] = 3 A[2] = 9
A[3] = 3 A[4] = 9 A[5] = 7
A[6] = 9

the function should return 7, as explained in the example above.

Assume that:

N is an odd integer within the range [1..1,000,000];
each element of array A is an integer within the range [1..1,000,000,000];
all but one of the values in A occur an even number of times.

QUESTION 4

Write a function($s) that takes in a String. Find the character that repeats the least and most times. If there are multiple characters having the same frequency, return the one that is alphabetically bigger.

To compare alphabets, ‘c’ is bigger than ‘a’. ‘h’ is smaller than ‘p’.

Example:
Let’s say we have a String $s = ‘embezzlement’.

Result:
Most times = ‘e’, because ‘e’ occurs 4 times.
Least times = ‘b’, ‘l’, ‘n’, ‘t’ occurs 1 time each, but the answer is ‘t’ because ‘t’ is alphabetically bigger than the rest.

QUESTION 5

You are given an array, which is a representation of stock market prices over 2 weeks. Each element of the array represents share price in one day (e.g. array index 0 = share price in day 1, array index 4 = share price in day 5).

Write a function to analyze the data, and return the trades (buy/sell) that needed to be done in order to maximize profit. There could be multiple buying and selling happening in 2 weeks' time.

The catch is you can only hold one trade at one time. You can only either buy or sell in one day – cannot do both. Your algorithm must work for any variation of stock market data, and for any duration.

Example:
Stock market data for 2 weeks:
[100, 80, 50, 145, 500, 400, 450, 300, 10, 55, 40, 15, 80, 90]

If you analyze this data by looking, we can easily tell that we can maximize profit by doing 4 trades.

So the results are:
BUY 50, SELL 500 (BUY day 3, SELL day 5)
BUY 400, SELL 450 (BUY day 6, SELL day 7)
BUY 10, SELL 55 (BUY day 9, SELL day 10)
BUY 15, SELL 90 (BUY day 12, SELL day 14)

QUESTION 6

Given 3 tables in MySQL database as below. This database is from an online store.

TBL_CUSTOMERS

USERID	NAME	ADDRESS	AGE
1	Adam	12, JALAN ABC	25
2	Jane	D-12-6 WISMA ABC	40
3	Dylan	12A, SOLOK ABC	16

TBL_TRANSACTIONS

ORDERID	TRANSACTION_DATE	ITEM	QUANTITY	UNIT PRICE
1001	2016-11-25 02:00:00	Apple	5	2.45
1002	2016-11-26 16:30:00	Orange	12	0.5
1003	2016-11-26 12:32:00	Pineapple	2	12.00
1004	2016-11-27 07:45:00	Peach	7	6.00
1005	2016-11-28 23:05:00	Durian	1	23.70

TBL_ORDERS

USERID	ORDERID
1	1001
2	1003
1	1004
2	1002
1	1005

1. Is this a good database design? Why?
2. If your answer to question 1 is no, what can you propose to improve the design?
3. Write a SQL query based on the above schema to retrieve information about the following items. Assume that TRANSACTION_DATE column is in UTC time zone. We need to generate report in Malaysia time.
    a. Who is the top spender in this online store?
    b. Tell me the number of transactions in each hour of the day.
    c. What kind of fruits (item) did Adam buy so far?
    d. What's the average transacted sale value for each customer?