

On my left is: (NetID)

MY NetID

On my right is: (NetID)

CSc 337 Final Examination  
December 13, 2013

**READ THIS FIRST**

Read this page now but do not turn this page until you are told to do so. Go ahead and fill in your NetID in the middle(!) box above. Ask your neighbors on each side to fill in their NetIDs and do the same for them. Use "Aisle" or "Vacant" if that's the case.

This is a 110-minute exam with a total of 100 points of regular questions and an extra credit section.

The last five minutes of the exam is a "seatbelts required" period, to avoid distractions for those who are still working. If you finish before the "seatbelts required" period starts, you may turn in your exam and leave. If not, you must stay quietly seated—no "packing up"—until time is up for all.

You are allowed no reference materials whatsoever.

If you have a question, raise your hand. We will come to you. DO NOT leave your seat.

If you have a question that can be safely resolved with a minor assumption, like the name of a function or the order of function arguments, state the assumption and proceed.

Feel free to use abbreviations.

If you're stuck on a problem, please ask for a hint. Try to avoid leaving a problem completely blank—that's a sure zero.

It is better to put forth a solution that violates stated restrictions than to leave it blank—a solution with violations may still be worth partial credit.

When told to begin, double-check that your name is at the top of this page, and then **put your initials in the lower right hand corner of the top side of each sheet, checking to be sure you have all 6 sheets.**

**BE SURE to enter your NetID on the sign-out log when turning in your completed exam.**

**Problem 1: (8 points)**

Circle the best answer for each of the multiple choice questions below.

The PHP `setcookie()` function causes

- (a) the browser to be sent a `Cookie:` header
- (b) the browser to be sent a `Set-Cookie:` header
- (c) a cookie to be saved in the session
- (d) all of the above

In PHP, the value of `"x" + 5` is

- (a) 0
- (b) 5
- (c) "x"
- (d) "x5"

The final result of an HTTP GET or POST that's received by the browser is called a...

- (a) message
- (b) query
- (c) request
- (d) response

Which of the following best describes the key function of a `<form>` element?

- (a) specifies a set of input elements to display in close proximity to each other
- (b) specifies the set of input elements that are to be treated as a security group
- (c) specifies the set of input elements whose values are to be sent in a single GET or POST
- (d) specifies the set of input elements that are required fields

Which one of the following does not have a standard (actual or proposed) that is maintained by an independent standards organization?

- (a) HTML
- (b) CSS
- (c) PHP
- (d) JavaScript

Which one of the following is not a JavaScript datatype?

- (a) `boolean`
- (b) `int`
- (c) `string`
- (d) `undefined`

Which of the following fully describes PHP arrays?

- (a) They are like Java arrays and Python lists.
- (b) They are like Java maps and Python dictionaries.
- (c) They are like Java sets and Python tuples.
- (d) None of the above.

SQL injection is when an attacker

- (a) Splices unexpected text into a query
- (b) Modifies the PDO `bindParam` call
- (c) Uses an XSS worm to execute a series of SQL queries
- (d) Replaces a network database with one that is SQL-enabled

**Problem 2: (8 points)** (points each as indicated)

XAMPP, MAMP, and WAMP provide LAMP-like stacks for various platforms. What do the letters A, M, and P stand for? (one point)

There's an important difference between where session data is stored and where cookies are stored. What's that difference? (one point)

Using only HTML there are two ways to make a page do an HTTP GET in response to an element being clicked. What are those two ways? (two points)

What's the basic idea of Ajax? (two points)

What's the basic idea of an XSS attack? (two points)

**Problem 3: (2 points)**

There's a new jQuery UI component, `TicTacToe`, which displays an  $N \times N$  (not  $3 \times 3$ ) Tic-Tac-Toe board. Assuming it follows the pattern of other jQuery UI components, write an expression to turn this `div` into a **5x5** Tic-Tac-Toe board:

```
<div id=board></div>
```

Hint: The component is named `ttt`. The author of the component likes short names for options, too.

**Problem 4: (8 points)** (two points each)

For each of the following PHP arrays describe a specific action or series of actions that would cause a value to be assigned to a key "x" in that array. For example, what's something that could cause `$_GET["x"]` to be 100?

NOTE: An assignment in the current run of the program is not an acceptable answer! For example, `$_GET["x"] = 100;` would be worth no credit.

`$_GET`

`$_POST`

`$_COOKIE`

`$_SESSION`

**Problem 5: (5 points)**

Write a `<script>` element that contains jQuery code that implements this behavior:

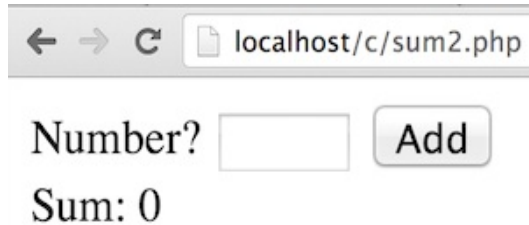
Clicking any paragraph element that is a child of an element with id "x" removes the last character in the paragraph. This may be repeated any number of times. If no characters remain, nothing happens.

Important: Assume that the `<script>` element will precede any paragraph elements in the HTML document.

Hint: `"abcd".substr(1,2)` is `"bc"`.

## Problem 6: (4 points)

Recall the `sum2.php` example from the slides:



Number?

Sum: 0

It allows a user to compute the sum of some number of integers. The user enters each number in turn, clicks **Add**, and the sum thus far is displayed.

Here's the source code for it:

```
<?php
error_reporting(22519);
$sum = $_GET["sum"] + $_GET["value"];
echo "
<!doctype html>
<title>Hidden</title>
<form action=sum2.php method=get>
    <input type=hidden name=sum value='$sum'>
    Number? <input type=text name=value size=5>
    <input type=submit value=Add> <br>
    Sum: $sum
</form>";
```

Question 1:

If `sum2.php` is used to compute the sum of the values 75, 28, and 104, how many times is `sum2.php` run?

Question 2:

Explain the reasoning behind your answer.

**Problem 7: (5 points)**

Write a PHP function `sum($values)` whose argument is a string containing a comma-separated list of positive integers and that returns the sum of those integers.

Assume the string is well-formed. If given an empty string, `sum` returns 0.

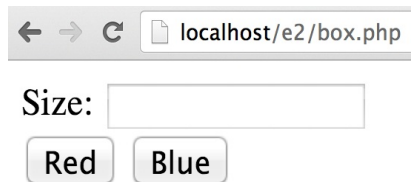
**Note that `sum` returns a value—it does no printing!**

```
php > echo sum("3,4");  
7  
php > echo sum("3,10,1,9");  
23  
php > echo sum("");  
0
```

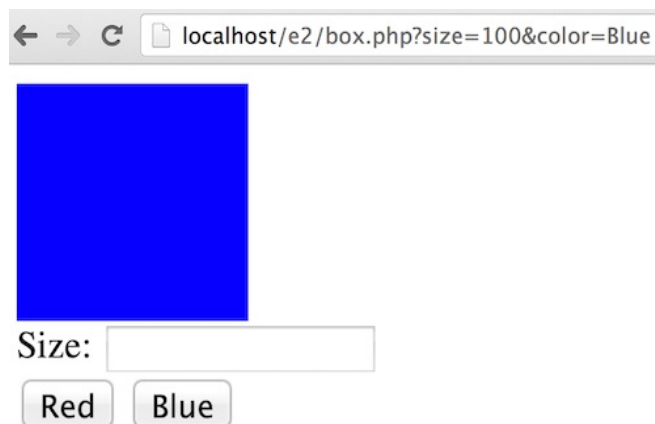
### Problem 8: (18 points)

Write a PHP program, `box.php`, that draws a red or blue square of the requested size.

If hit with no URL parameters, `box.php` produces this:



If the user then enters a size, like 100, and clicks either **Red** or **Blue**, a 100x100 pixel square having the indicated color is drawn:



**Important: Implement it in such a way that the user's inputs are shown in the URL, like above.**

The user may then enter 50 and click **Red** to see a 50x50 pixel red box, and so on.

If the user clicks **Red** or **Blue** without having entered a size, they should receive a simple notification that a size is required. (Hint: that should only require a tiny addition to your solution.)

### Problem 9: (42 points)

For this problem you are to write a PHP program that displays a list of images and the number of times each image has been viewed. Each image has a **View** button that if clicked displays the image on a page by itself. That page has a Back link that the user can click to return to the list of images.

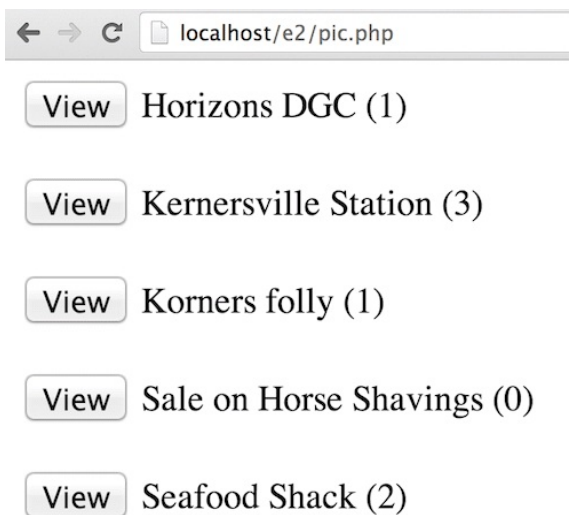
Here is the SQL used to create the table:

```
create table picture (  
    id      bigint not null auto_increment primary key,  
    name    varchar(50) not null,  
    file    varchar(50) not null,  
    views   int not null  
);
```

At a given moment the table might contain these rows:

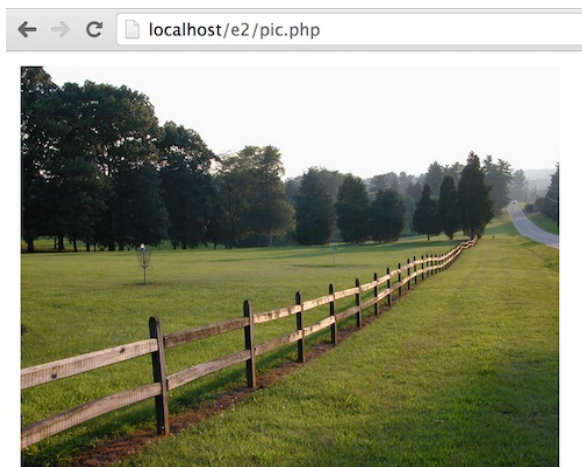
```
mysql> select * from picture;  
+----+-----+-----+-----+  
| id | name                | file                | views |  
+----+-----+-----+-----+  
|  1 | Korners folly      | folly.jpg          | 1    |  
|  2 | Seafood Shack      | seafoodshack.jpg  | 2    |  
|  3 | Horizons DGC       | horizonsdgc.jpg   | 1    |  
|  4 | Kernersville Station | trainstation.jpg  | 3    |  
|  5 | Sale on Horse Shavings | wbsale.jpg        | 0    |  
+----+-----+-----+-----+  
5 rows in set (0.00 sec)
```

Given the rows above, hitting the app would display the following. Note that (1) pictures are in alphabetical order by picture name (not file name!), and (2) the number of views is shown in parentheses following the picture name.





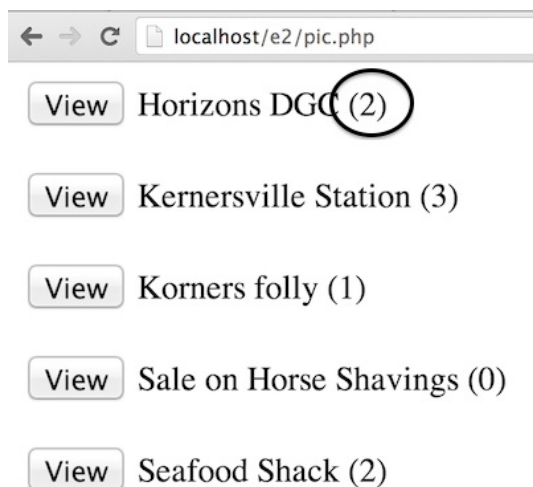
If the **View** button beside "Horizons DGC" were clicked, the user would then see this:



[Back](#)

**Note that no URL parameters are shown—it's just . . . /pic.php, nothing more, in the browser's address field.**

Upon clicking **Back** the user would then see the list of pictures again, and the view count for Horizons DGC would be "2", one more than it was previously (circled for emphasis, not shown by app!):



Checklist:

1. Pictures are shown in alphabetical order by name.
2. **View** button is on left of picture name; view count is on right.
3. Clicking **View** shows page with only picture and **Back** link, which shows view with list.
4. A side-effect of viewing a picture is that the view count is incremented.
5. No URL parameters are displayed.
6. **Your solution must not be vulnerable to a SQL injection attack!**

Hints: (1) The SQL statement `update picture set views=views+1` will increment the view count for all pictures. Just add an appropriate `where` clause to it! (2) Assume you have a `newconn()` function like shown in the slides, which returns a database connection.

Space for pic.php solution.

**BE SURE TO REVIEW THE CHECKLIST ON THE PREVIOUS PAGE!**

Even more space for pic . php solution.

**BE SURE TO REVIEW THE CHECKLIST ON THE PREVIOUS PAGE!**

**Extra Credit Section (½ point each unless otherwise noted)**

- (1) I've made the TAs learn all your names but let's see if you've learned theirs. What are the TA's names and which one has red hair?
- (2) It's redundant to say "Write a `<script>` element..." or "a click on a `<p>` element...". Why is that?
- (3) What is *Lorem Ipsum*?
- (4) Write the shortest possible valid HTML5 document.
- (5) Here's a jQuery question that was scratched because when whm wrote his solution it didn't work!

*"Click a paragraph. If its text is blue, turn it black. If it's black, turn it blue."*

What's the bug whm had in his solution?

- (6) It's been said that a programmer should know only three numbers. What are they?
- (7) Describe in detail the visual effect of each of the following CSS declarations: (one point)

```
color: "red"
```

```
font: "sans-serif"
```

```
width: 300
```

- (8) If you only remember one thing from this class, what will it be? (Ok to try to be funny!)