

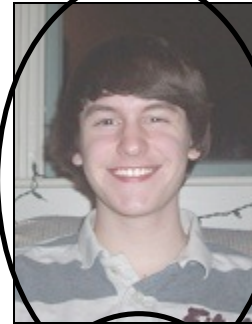
## Quiz 1

### Answer Key

Answers other than the below may be possible.

#### Know Your Meme.

0.



#### True or False.

1. T
2. F
3. F
4. F
5. T

#### Attack.

6. By never making assumptions as to the length of users' input and always checking the size of buffers (e.g., arrays) before writing into them.
7. By not using unencrypted Wi-Fi and by avoiding use of sites that don't offer SSL.

### Passwords, etc.

8. Anyone with access to the database (whether a good guy or bad guy) could see users' passwords and potentially masquerade as those users. And because users tend to use the same passwords on multiple sites, their other accounts might also be vulnerable to unauthorized access.
9. A one-way hash is a fixed-length string outputted by a function that takes variable-length strings as input. Although it is easy to compute the former given the latter, it is computationally expensive (*i.e.*, time-consuming) to compute the latter given the former.
10. Upon submission of a user's password, the website can compute a one-way hash of that password in precisely the same manner as it did before storing it in the database and then compare the two hashes. If identical, the website concludes that the user indeed inputted the right password.

### CS50 Stack.

```
11. int
    pop(void)
    {
        if (stack.size == 0)
            return -1;
        return stack.numbers[--stack.size];
    }
```

```
12. bool
    push(int n)
    {
        if (stack.size == CAPACITY || n < 0)
            return false;
        stack.numbers[stack.size++] = n;
        return true;
    }
```

13. Because a stack is a LIFO (last in, first out) structure, `stack.size` also happens to demark the top of the stack inasmuch as the index of the stack's topmost `int` is always `stack.size - 1`, assuming the stack isn't empty. Because a queue is a FIFO (first in, first out) structure, the index of the queue's first `int` will change over time (from 0 to 1 to 2 and beyond) as each `int` is dequeued; without `queue.head`, you might have to keep shifting every remaining `int` toward index 0, which would be computationally expensive (*i.e.*, time-consuming).

### Trie these.

14. A trie offers constant-time lookup of words (assuming words' length is bounded by some constant): to check whether a word of length  $m$  is in a trie requires only  $O(m) = O(1)$  steps.

15. Tries tend to waste lots of memory since many nodes' pointers end up unused since there are far fewer English words than there are possible permutations of the English alphabet's letters.

### Design Decisions.

16. Whereas C tends to be best for high-performance applications (because it's compiled), PHP tends to be better for web programming (because it was designed with browsers in mind) and command-line scripting (because it comes with a richer set of functions).
17. Whereas PHP is well-suited for server-side generation of HTML and database queries, JavaScript allows websites to interact with users client-side (as via features like auto-complete, drag-and-drop, mouseovers, and more).
18. Local variables should be used whenever possible so as to restrict variables' scope as tightly as possible so that they're only accessible where needed. A global variable might be justified when its usage simplifies code, as by eliminating the need to pass some local variable around to multiple functions.

### O no, it's Omega again.

- 19.

	lower ( $\Omega$ )	upper ( $O$ )
insertion into a <b>hash table with separate chaining</b>	1	1
insertion into a <b>trie</b>	1	1
insertion into a <b>sorted linked list</b>	1	$n$
deletion from a <b>sorted linked list</b>	1	$n$
deletion from an <b>unsorted linked list</b>	1	$n$

### Too much to handle.

20. This line configures the `XMLHttpRequest` object to call `handler` upon any change in its internal state (e.g., upon the server's response).
21. The parentheses transform the expression into a function call, and so `handler` would actually get called right away, its return value assigned to `xhr.onreadystatechange`.
22. JavaScript is a client-side programming language supported by today's browsers (though it can now be used server-side as well). Ajax is a programming technique that couples JavaScript with

XML (or JSON) in such a way that browsers can request additional data from servers via HTTP even after an initial page load is complete. jQuery is a JavaScript library that simplifies common operations (e.g., Ajax).

### Déjà Vu.

```
23. <!DOCTYPE html>

<html>
  <head>
    <title>pennies</title>
  </head>
  <body>
    <?
      $total = $p = $_GET["p"];
      for ($i = 2; $i <= $_GET["d"]; $i++)
      {
        $p *= 2;
        $total += $p;
      }
      printf("$%.2f\n", $total / 100.00);
    ?>
  </body>
</html>
```

### Rapid Fire.

24. Octal notation (otherwise known as base-8) is a base system with 8 digits: 0 through 7. It happens to be used by `chmod` for permissions.
25. An associative array is an array whose indices can not only integers but strings and other types as well. Put another way, it is an object with key-value pairs.
26. Included among the HTTP headers sent by a browser will be a `Host` header, which indicates the desired domain.
27. Otherwise known as a lambda function, an anonymous function is a function without a name. Popular in JavaScript, anonymous functions can be passed as inputs to functions so as to be called later.

### Compare and Contrast.

28. Both lines escape users' input for security's sake.

29. Whereas the first line escapes users' input so that it won't be potentially rendered as actual HTML (lest the user have inputted some tags or entities), the second line escapes users' input to avoid a SQL injection attack (lest the user have inputted a SQL statement or portion thereof).

#### CS50 Queue.

30. `id` should be declared as a primary key because it's guaranteed to be unique, thanks to its autoincrementation. With `id` can the right rows be updated reliably (because it's unique) and efficiently (because it's only 32 bits).
31. `SELECT * FROM questions WHERE date = '2011-10-31'`
32. `UPDATE questions SET staff = 'tmacwill' WHERE staff = 'chartier'`

#### Thefacebook.

33. `http://facebook.com/home.php`
34. These headers induce redirection: upon receipt of these headers (specifically `Location`), the browser will issue an HTTP request for `http://www.facebook.com/`.
35. A server might respond with 403 if some file or directory is not configured with the right permissions (*e.g.*, as readable or executable), as via `chmod`.

#### HarvardCourses.

36. To set a cookie means to store a key-value pair in RAM or in a file on some computer for subsequent retrieval.
37. `PHPSESSID` is a cookie whose value is string that uniquely identifies a user's browser. After receipt of that cookie, a browser, by nature of HTTP, will include that cookie's value in all subsequent requests to the website that set it. That value maps, server-side, to a file (or database row) that contains the contents of `$_SESSION`, a PHP superglobal in which a website can store key-value pairs. Ultimately, `PHPSESSID` allows a website to maintain state for a user (inside of `$_SESSION`) even though HTTP itself is stateless.

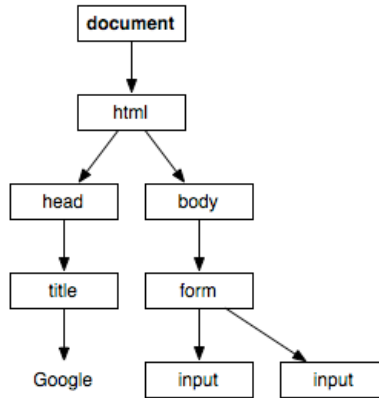
#### Jason Encode.

38. `{"name":"Jason","house":"Kirkland"}`

### Sketchy Web Page.

39. <http://www.google.com/search?q=catepillar>

40.



### Almost the End.

41. `<!DOCTYPE html>`

```
<html>
  <head>
    <script>

      function f()
      {
        var email = document.getElementById("email").value;
        var email2 = document.getElementById("email2").value;
        if (email == "" || email2 == "")
          return false;
        if (email != email2)
          return false;
        return true;
      }

    </script>
    <title>subscribe</title>
  </head>
  <body>
    <form action="subscribe.php" method="post" name="s" onsubmit="return f();" >
      Email Address: <input id="email" name="email" type="text">
      <br>
      Email Address (again): <input id="email2" name="email2" type="text">
      <br>
      <input type="submit" value="Subscribe">
    </form>
  </body>
</html>
```

42. 42