Appendix B   Answers to Self-Check Problems

Chapter 1: The Internet and World Wide Web

1. The Internet is a worldwide set of computer networks that spans many technologies. The World Wide Web is a subset of the overall Internet, the set of all web pages and sites.
2. The internet is able to send data as "packets", its network subsets can stand on their own, computers can be dynamically added and removed from it, it's based on open standards, and it has a lack of centralized control.
3. IETF decides on standards for the Internet. W3C decides on web standards.
4. IP is a simple protocol that provides two-way communication and addressing. TCP adds reliable communication, flow control and sequencing, and multiplexing of many programs on the same Internet connection.
5. Legal: 150.135.1.150, 10.0.0.1. Illegal: www.google.com (this is a domain name, not an IP address), 123.456.789.10 (456 and 789 are out of range), 241.259.17.127 (259 is out of range).
6. At this moment, our computer reports that google.com is 74.125.113.103, facebook.com is 69.63.176.143, microsoft.com is 65.55.12.249, and mozilla.org is 63.245.209.11. But many of these sites have multiple IPs, so your results may differ.
7. Mozilla Firefox, Internet Explorer, Safari, Opera, Google Chrome. Apache web server. A site designer must be careful about different browsers because each one supports web standards in slightly different (and sometimes incompatible) ways, but the site designer still wants the site to work for all users.
8. http://www.coralcdn.org.nyud.net:8080/bin/bookmark/coralize.js
9. By convention, a GET request retrieves information from a web server, and a POST request submits new information to a web server.
10. An HTTP error 403 means that the user is forbidden to access a page. An error 500 means that there is an internal server error.

Chapter 2: HTML Basics

1. HTML should be used to mark up the content of a webpage based on the meaning of the content rather than on its appearance. XHTML is a stricter language than HTML that has syntax that is more regular and standardized than HTML. XMTML focuses on describing the document's content and structure while (older) HTML describes a document's content, appearance, and behavior.
2. The author has chosen tags that don't describe their content accurately. "Traveler Times" is main heading of the document so should be surrounded by h1 tag, but instead is surrounded by an h2 tag. The subheadings don't proceed in order (i.e. a subheading of h1

539

should be an h2 tag, a subheading of an h2 tag should be an h3 tag, etc.) but appear to be chosen to achieve a particular appearance. Lastly, rather than surrounding the paragraphs that describe each destination by p tags, the author has inappropriately used the h6 tag.

3. A block element is a significant item on the page that occupies a rectangular block of space on the page while an inline element is a smaller item on the page that resides inside of a block element. Headings (h1 - h6) and paragraphs (p) are block elements while images (img) and links (a) are inline elements.

4. An element is a piece of HTML that surrounds text content and describes its meaning on the page. An attribute is additional information about an HTML element and is placed inside the elements opening tag. The image element (img) is required to have two attributes: the src attribute and the alt attribute.

5. ul elements represent lists whose items have no order whereas ol elements represent lists where the order of the items is important.

6. caption, th, and tr tags can be directly nested in the table tag. td tags can be directly nested in the tr tag.

7.

```
<p>
  Today's HTML lesson:<br />
  To place a &lt; in your page, write &amp;lt; in the HTML.<br />
  To show an &amp;, put &amp;amp; instead.<br />
</p>
```

8. The pre element can be used to respect the whitespace in a piece of text.

9. Web standards are a group formal standards and technical specifications for various aspects of the World Wide Web. You should follow web standards because compliant pages are more likely to render correctly in a variety of browsers. Additionally, compliant pages are more likely to produce relevant search results and are more accessible to users with disabilities.

10. At this moment, the W3C Validator reports that google.com has 35 errors and 2 warnings, but the Google webpage changes regularly, so your results may differ.

11. (Use the W3C Validator to check 3 websites.)

12. Three uses of meta tags are to describe the page to help search engines catalog it appropriately, to provide information to web editing software, and to inform the user's browser that the page has moved to a new location. The meta tag with a name attribute specified as description is used for a search engine snippet.

13. HTML editing programs insert meta generator tags in documents created in them in order to know if a web pages are created by the program. Knowing that an HTML page was created by the program may give the program more information about how the page was setup.

Chapter 3: CSS for Styling

1. By placing CSS code into its own file the CSS content is completely separated from the HTML and so emphasizes the separation of content from presentation. Additionally, if the style sheet is a separate file, it can be used by many HTML documents.

2. The three ways to specify a color in CSS are: predefined color names, red-green-blue color codes, and hexadecimal color codes. Any one of the following CSS rules could be

used to specify a brown background (your red-green-blue and hexadecimal color codes may be slightly different if you found a different shade of brown):

```
background-color: brown;
background-color: #A52A2A;
background-color: rgb(165, 42, 42);
```

3. The CSS fragment has six mistakes including: (1) the property `background color` should have a dash between the two words (i.e. `background-color`), (2) to specify the foreground color the `color` property should be used (i.e. `foreground-color` is not a valid CSS property), (3) the two f's in the `font-family` property should be lowercase, (4) multi-word font names must be enclosed in quotes (i.e. `"New Times Roman"`), (5) there should not be a comma after the `h3` selector in the second rule, and (6) the correct CSS property to represent boldness is `font-weight` not `font-style`.

4. The following CSS would cause unordered and ordered lists to have blue text and black background:

```
ul, ol {
  color: blue;
  background-color: black;
}
```

5. The `id` attribute is used to name one particular HTML element on the page whereas many HTML elements can have the same `class` name so use the `id` attribute when you want to style one particular element and the `class` attribute when you want to style a number of elements.
    a. `id`
    b. `class`
    c. `h2` selector

6. `body`: foreground color is blue, background color is yellow
   `p`: foreground color is red, background color is yellow
   `div`: foreground color is green, background color is yellow
   `div` → `p`: foreground color is red, background color is yellow
   `ul`: foreground color is green, background color is yellow
   `ul` → `li`: foreground color is green, background color is cyan

7. The CSS file is using the wrong comment style. The first comment is using HTML style comments and the second comment is using single line comment style. CSS comments use C-style comments (i.e. `/* … */` not `<!-- … -->` or `//`).

8. The names of the id and the class are poor because they focus on appearance rather than the meaning of the content.

9. Here are our results, but web pages change regularly so your results may differ:
    a. wikipedia.org: 1 error
    b. imdb.com: 159 errors
    c. amazon.com: 30 errors

10. The four errors in the CSS code are: (1) `text-decoration: underlined` should be `text-decoration: underline` (with no d) (2) there should be a colon instead of a semi-colon after `text-indent`, (3) there should be a semi-colon instead of a colon at the end of the `text-indent` rule, and (4) `text-decoration: blinking` should be `text-decoration: blink`.

Chapter 4: Page Layout

1. The `div` element is a block element that represents a division or section of a page while a `span` is an inline element that represents a meaningful span of text.
   a. `span`
   b. `div`
   c. `span`
2. The first rule (a) is more general.
3. `body`: foreground color is blue, background color is yellow
   `p`: foreground color is red, background color is yellow
   `div`: foreground color is blue, background color is yellow
   `div → p`: foreground color is blue, background color is cyan
   `ul`: foreground color is red, background color is cyan
   `ul → li`: foreground color is blue, background color is cyan
4. (e) 18em
5. Padding gives space between the inline contents of an element and its border whereas margin gives separation between neighboring elements.
6. (c) best matches the appearance the code would have in the browser.
7. `float: right` lifts the entire element out of the normal page layout and positions it to the right. `text-align:right` aligns only the text within the element to the right.
8. If two consecutive elements float in the same direction, they stack horizontally. The first one is the furthest toward the float direction and the second would sit horizontally beside it (for example, if the two elements float right, the first one will be the furthest right and the second one will be horizontally floating just to its left).
9. It is important to set a `width` on a floating element because if no width is specified, the floating element's content will occupy 100% of the page width and there will be no room for content to wrap around it.
10. The `overflow` property designates the action to take when an element's content is larger than the element itself. Since floating elements are lifted up out of the normal document flow, they have no effect on the width or height of the block element containing them so if you place a tall floating element inside a block element without much other content, the floating element may hang down past the bottom edge of the block element that contains it. By setting the block element's `overflow` property to either `hidden` or `auto`, the browser will make the element large enough to fit the floating content.
11.

```
h1 {
  border: 2px solid gray;
  float: left;
  font-size: 1em;
  padding: 0.5em;
  margin: 1em;
}
img {
  float: right;
  margin-left: 1em;
}
#main {
  border: 2px solid black;
  margin-left: 10%;
  overflow: hidden;
  text-align: right;
  width: 80%;
}
```

12.

```
p {
  margin-left: auto;
  margin-right: auto;
  text-align: right;
  width: 50%;
}
```

13.

```
p {
  margin-left: auto;
  text-align: left;
  width: 50%;
}
```

14. `margin`, `margin-left`, `padding`, `padding-bottom` and `padding-left` have an effect when set on inline elements. There are some exceptions for `img` elements.

15. `top`, `bottom`, `middle`, `baseline`

16. Absolute positioning sets the element's location at an offset relative to the block element containing it whereas fixed elements are positioned relative to the overall browser window.
    a. fixed
    b. absolute
    c. absolute
    d. fixed

17. `display: none;` means the element does not occupy space on the page ("It's not there") whereas `visibility: hidden;` means the element still occupies space on the page, but its contents are not drawn and it is invisible to the user ("It's there, but I can't see it"). You can tell the two apart by looking at a page because an element with `visibility: hidden;` still occupies the space that it would have occupied if it had been drawn whereas an element with `display: none;` occupies no space at all.

Chapter 5: PHP for Server-Side Programming

1. Static content is a file (usually an HTML file) that is sent directly back to the client when the client requests it – no generation or processing is necessary by the web server to send static content back to the client. Dynamic content is content that is generated on the fly by a web server when a client requests it. PHP code is dynamic content.

2. A server runs PHP code. PHP code is run before a web page is sent to a user's computer.

3. Compiled languages must be compiled to machine instructions before their programs can be run. Interpreted languages are translated to machine instructions and executed on the fly, rather than having to be compiled ahead of time. PHP is an interpreted language.

4. The results of the expressions are:
   - a. 6.5
   - b. 6
   - c. 6
   - d. 3.7714285714286
   - e. "2 + 2 34"
   - f. "7 2 . 2"
   - g. 9.85
   - h. 37.833333333333
   - i. 4
   - j. 9

5.

```
$c = pow($a, 2) + pow($b, 2);
```

6. The expressions are:
   - a. `$s[0]`
   - b. `strlen($s)`
   - c. `$s[strlen($s) - 1]`
   - d. `$s[(int)(strlen($s) / 2)]`
   - e. `substr($s, 0, 5)`

7. The results of the expressions are:
   - a. FALSE
   - b. TRUE
   - c. TRUE
   - d. TRUE
   - e. FALSE
   - f. TRUE
   - g. TRUE
   - h. FALSE
   - i. TRUE
   - j. TRUE

8. The value of **$balance** after the code runs is **3**.

9. The value of **$sum** after the code runs is **5**.

10.

```
<body>
  <ul>
    <?php
    for ($i = 99; $i >= 0; $i--) {
      ?>
      <li> <?= $i ?> bottles of beer on the wall.</li>
      <?php
    }
    ?>
    </ul>
</body>
```

11. An expression block is a PHP structure that is used in HTML mode to represent a very short switch into PHP mode in order to inject the value of a single PHP expression into the page. Expression blocks have simpler syntax and are easier to read than using `print` statements.

12.

```
<h1>Hello, <?= $name ?></h1>
```

13. The first error is that the `if` statement's closing bracket is not contained in a `<?php` block. The second error is that the expression block should begin with `<?=` not `<?` (i.e. it is missing the `=`).

14.

```
-2 + 4 = 7
4 + -2 = 3
2 + 11 = 5
```

15.

```
function quadratic($a, $b, $c) {
  $numerator = ($b * -1) + sqrt(pow($b, 2) - 4 * $a * $c);
  $denominator = 2 * $a;
  return $numerator / $denominator;
}
```

16. The 0th index of `$a` contains `1`, the 1st index contains `2`, and the 2nd contains `3`.

17. The contents of the arrays are found below:
    a. (14, 7)
    b. (7, 1, 3, 2, 0, 4)
    c. (10, 8, 9, 5, 5)
    d. (12, 11, 10, 10, 8, 7)

18.

```
<body>
  <?php
  foreach (glob("*.png") as $filename) {
    ?>
    <img src="<?= $filename ?>" alt="image in directory" />
    <?php
  }
  ?>
</body>
```

Chapter 6: HTML Forms and Server-Side Data

1. http://www.google.com/s?q=John+McCain
   http://www.google.com/s?q=Sarah+Palin&start=5
2. The **name** attribute determines the query parameter used to submit the form data to the server. The **id** attribute is a target for CSS styling, and later for JavaScript behavior. An **id** cannot substitute for a **name**.
3. The **value** of a text box indicates the text that has been typed into the box. The **value** of a submit button indicates the text to display on the button itself.
4. The **size** attribute indicates the display size of the textbox on the page, while the **maxlength** attribute indicates a limit of the maximum number of characters the browser should allow the user to type into the box. To set a **textarea**'s size, use the **rows** and **cols** attributes instead.
5. http://webster.cs.washington.edu/params.php?name=Jessica+Miller&male=on&female=on
   The form is bad because it allows the user to choose both genders. They should share a same name attribute such as **"gender"** and have **value** attributes to distinguish them, such as **"male"** and **"female"**.
6. Give the radio buttons the same **name** attribute and different **value** attributes.
7. The radio buttons do not have value attributes. The code should be:

```
<input type="radio" name="stooge" value="Larry" /> Larry
<input type="radio" name="stooge" value="Moe" /> Moe
<input type="radio" name="stooge" value="Curly" /> Curly
```

8. A drop-down box is made with the **select** and **option** tags. The options can be arranged into groups using the **optgroup** tag. A multi-line list box is created by setting the **size** attribute of the **select** box to a value greater than 1.
9. The **select** box should have the **name** attribute, and the **option**s should have **value** attributes:

```
<select name="stooge">
  <option value="Larry">Larry</option>
  <option value="Moe">Moe</option>
  <option value="Curly">Curly</option>
</select>
```

10. http://webster.cs.washington.edu/params.php?title=Math+%26+Science+Basics&equation=1+%2B+1+%3D+2
11. A hidden input parameter is not shown on the page to the user, but it is still sent to the server along with the other parameters. The reason to use it over a normal text box is that perhaps the page author doesn't want to clutter the page with it or does not want the user to change its value.
12. A GET request is intended to indicate a request for information from the server. It sends any query parameters as part of its URL. A POST request is intended to indicate a submission of data to a server. It sends its query parameters as part of its HTTP packet header and not in the URL.
13.
    a) GET
    b) POST
    c) POST
    d) GET
    e) POST

14. A superglobal is a special array whose data can be accessed from anywhere in your program. An associative array can use any type of value for its indexes, such as strings.

15.

```
$_REQUEST["address"]
if (isset($_REQUEST["vegetarian"])) { ... }
```

16.

```
$name = $_REQUEST["name"];
$age  = $_REQUEST["age"];
if ($age < 40) {
  print("Hello $name, you are $age.  That is old!");
} else {
  print("Hello $name, you are $age.  What a whipper-snapper!");
}
```

17. The `$_FILES` array contains information about uploaded files. The following code would move the given uploaded file:

```
if (is_uploaded_file($_FILES["turnin"]["tmp_name"])) {
  move_uploaded_file($_FILES["turnin"]["tmp_name"], "hw/HW1.java");
}
```

18.

```
if (is_uploaded_file($_FILES["turnin"]["tmp_name"]) &&
    strpos($_FILES["turnin"]["name"], ".java") ==
    strlen($_FILES["turnin"]["name"]) - 5 &&
    $_FILES["turnin"]["size"] >= 256) {
  move_uploaded_file($_FILES["turnin"]["tmp_name"], "hw/HW1.java");
}
```

Chapter 7: JavaScript for Interactive Web Pages

1. A JavaScript program runs in a client's browser after a page has been downloaded from the server to the client, as opposed to a PHP program, which runs on the server before sending the page to the client.
2. An event is an action that occurs on the page, often triggered by user interaction such as clicking a mouse button or pressing a key. Event-driven programming causes a program's entire flow of control to be dictated by events and functions that run in response to those events.
3.

```
<script src="example.js" type="text/javascript"></script>
```

4. The `alert` function displays a pop-up message box of information.
5. The Document Object Model (DOM) is a structure of interconnected JavaScript objects that correspond to the tags on an HTML page. You can access particular tags' DOM objects to set properties of the corresponding HTML content on the page.
6. JavaScript uses the `Number` type to represent both integers and real numbers.
7.

```
var gpa = 2.7;
```

8. If you assign a value to a variable without declaring it, the variable is automatically created as a global variable.

9.
   1) Put an alert statement in your JS code to see if it pops up.
   2) Check Firebug's error console for possible errors.
   3) Paste the JS code into JSLint.

10.
   a) 7
   b) "7 2 + 2"
   c) 13
   d) 1.25
   e) 30
   f) 1
   g) 18
   h) 0.25
   i) 6.5
   j) 3
   k) 6
   l) 3.25
   m) "2 + 2 34"
   n) "$2.251"

11.
   a) 1.6
   b) 2
   c) 36
   d) 10
   e) 7
   f) -5
   g) 8
   h) 142
   i) 20
   j) 10

12.
   a) 6
   b) "q.e.d."
   c) "egad"
   d) 1
   e) 13
   f) -1
   g) "Arcturan Megadonkeys"
   h) "Cyber"
   i) "b"
   j) "mega"

13. The value **null** indicates a definite empty value. It is returned by several functions such as **document.getElementById** to indicate that no result was found. The value **undefined** indicates nothing at all; the lack of any value or object. Void functions (ones that don't ex-plicitly return a value) return **undefined**. It would be inappropriate to return **undefined** as

a failure code to indicate that a result was not found, because this is indistinguishable from a void function.

14. The `===` operator evaluates to true if its two operands have exactly the same value of the same type. The `==` operator looks for equivalent values and can evaluate to **true** if the two operands are considered equivalent, such as `2` and `"2"`.

15.
    a) falsey
    b) truthy
    c) falsey
    d) falsey
    e) truthy
    f) falsey
    g) falsey

16.
```
a) 2
b) 42
c) 0
d) "me"
e) null
f) "1"
g) 1
```

17.
```
if (!amount) {
  var warning = document.getElementById("warningarea");
  warning.innerHTML = "You did not type an amount! Try again.");
}
```

18.
    a) 4
    b) 2
    c) 3
    d) "me"
    e) 6

19.
```
var name = ["Jennifer", "Love", "Hewitt"];
```

20. The `slice` method retrieves a sub-range of an array between a given starting and ending index. The `splice` method removes a range of elements and inserts something new in its place.

21. `["Amit", "Victoria", "Stef"]`

22.

```
function isPalindrome(str) {
  var palindrome = true;
  var half = parseInt(str.length / 2);
  for (var i = 0; i < half; i++) {
    if (str[i] != str[str.length - 1 - i]) {
      palindrome = false;
      break;
    }
  }

  if (palindrome) {
    alert("This is a palindrome! " + str);
  }
}
```

23.

```
function fToC(tempF) {
  return (tempF - 32) * 5 / 9;
}
```

Chapter 8: The Document Object Model (DOM)

1. Unobtrusive JavaScript means not having any JavaScript code or event attributes in HTML files. Putting in such "obtrusive" content is poor style because it does not separate content from behavior. A key change to make code unobtrusive is to move all event handlers into a `window.onload` handler in the JS file rather than in the HTML file.

2. The six global JavaScript objects are: `document`, representing the current page; `history`, representing the list of pages the user has visited; `location`, representing the current page's URL; `navigator`, representing the user's web browser; `screen`, representing information about the computer screen; and `window`, representing the current browser window/tab being used to show the page.

3. A "user agent" string is a string in a particular format that identifies a user's web browser to a web server. The user agent string is sent to the server when the browser requests a page. It is a bad idea to write JavaScript code that uses the user agent string to guide its behavior, because browsers change capabilities frequently and can masquerade as one another.

4. The HTML code should have its `onclick` handlers removed, and the buttons should be given `id` attributes:

```
<body>
  <div><img id="hangmanpic" src="hangman6.gif" alt="hangman" /></div>
  <div id="clue">Press New Game to play!</div>
  <div>
  <input id="guess" type="text" size="1" maxlength="1" />
  <button id="guess">Guess</button>
  </div>
  <div id="newgamearea">
  <button id="newgame">New Game</button>
  </div>
  <div id="guesses"></div>
</body>
```

And the JavaScript code should receive a `window.onload` handler to attach the event-handling functions to the buttons:

```
window.onload = function() {
  document.getElementById("guess").onclick = guessLetter;
  document.getElementById("newgame").onclick = newGame;
};
```

5. An anonymous function is one that is declared but not given a name. It can be useful when you want to pass a function as a parameter or when attaching functions as event handlers, such as `window.onload`.

6. Since the inner text of each button begins with the number of points to add to the total score, all of the buttons can share an event handler that grabs `this` element's points as an integer and adds them to the total:

```
function handleClick() {
  var total = document.getElementById("total");
  total.value = parseInt(total.value) + parseInt(this.innerHTML);
}
```

7. The `textContent` property represents the inner text inside of an HTML element, ignoring any child elements. The `innerText` property is a non-standard property used by Internet Explorer that does the same thing; it should not be used. The `innerHTML` property is similar to `textContent` except that it also contains the text of any child elements including their tags. The value property corresponds to the value attribute on HTML form controls, so it is useful for getting/setting the text in a text field for example.

8. To change an element's background color, access that DOM element's object by ID and then set its `.style.backgroundColor = "blue";` or whatever color is desired. To make an element float to the left, set its `.style.cssFloat = "left";`

9.

```
mybox.style.width = "500px";
```

10. You can set an element's CSS classes using the DOM by setting its `.className` property.

11. Unobtrusive styling is when you set styles in your JavaScript code by adding and removing classes from elements rather than by directly setting the `style` attribute of those elements. It is desirable because then it is easier to change the appearance of the page by simply editing the `.css` files (which can be done by non-programmers) rather than having to edit the JavaScript code.

12.

```
mybox.className = "constrained";    // in JS file
```

```
.constrained {                      /* in CSS file */
  width: 500px;
}
```

13. DOM objects are connected to each other in a tree with links between parents and their children.

14. The three types of DOM nodes are element, attribute, and text. Lists of children and siblings consist of element and text nodes.

15. The footer node has 5 children: the two paragraph elements, and the whitespace text before, after, and between them.

16. You can avoid text nodes by checking the `nodeType` property of each child node, or by calling the `getElementsByTagName` method of the node to retrieve only its children that are elements.

17.

```
var main = document.getElementById("main");
var lis = main.getElementsByTagName("li");
for (var i = 0; i < lis.length; i++) {
  lis[i].style.fontStyle = "italic";
}
```

18.

```
var main = document.getElementById("main");
var h1 = document.createElement("h1");
h1.innerHTML = "Welcome to my page!";
main.insertBefore(h1, main.firstChild);
```

19.

```
var main = document.getElementById("main");
var paragraphs = main.getElementsByTagName("p");
for (var i = 1; i < paragraphs.length; i += 2) {
  main.removeChild(paragraphs[i]);
}
```

Chapter 9: Events and the Prototype Library

1. `[3, 5, 19, 27]`
2.

```
$("box").hide();
$("box").remove();
```

3.

```
if ($("box").getStyle("font-style") == "bold") {
  $("box").style.fontStyle = "italic";
}
```

4. A parent is the node immediately containing another node (its child), while an ancestor is either the parent or one of its parents (or parents' parents, etc.). Similarly, a child is a node directly contained inside the current node, while a descendant is a child or any child/grandchild/etc. of those children.

5.

```
var paragraphs = $$("div#container p.story");
```

6.

```
$("bomb").observe("mouseover", kaboom);
```

7. An event can be aborted by calling the **stop** method on the event object passed as a parameter to the event-handler function. This is useful to stop an event's normal browser behavior, such as submitting a form or closing a window.

8. A **click** is a mouse press and release in a short amount of time without moving the mouse cursor very much. A **mousedown** is simply pressing down the button, regardless of when/where it is eventually released.

9. Prototype indicates whether the left or right mouse button was pressed through the event object's **isLeftClick** method.

10. The mouse coordinates can be relative to the window, page, or screen. These coordinates might be the same if the browser is looking at the top-left part of the page and/or if the browser window occupies the entire screen. They differ if the user has scrolled down the page and/or if the browser window has toolbars and other features that occupy some pixels at the top of the screen.

11. On a key event, find out the character typed using the event object's `keyCode` property. Modifiers such as Alt and Shift can be found by checking the event's `altKey`, `ctrlKey`, and `shiftKey` properties.

12. Keyboard focus refers to which element on the page is currently actively receiving keyboard input from the user. The user can often tell which element has focus because a cursor is shown blinking in that element. On some operating systems the active element also highlights or otherwise visually indicates its focus.

13. The `setTimeout` function causes a single event to occur after a given delay. The `setInterval` function causes an event to repeatedly occur every N milliseconds.

14. A timer can be aborted by using the `clearTimeout` or `clearInterval` functions, passing the timer itself as a parameter.

Chapter 10: Ajax and XML for Accessing Data

1. "Ajax" stands for "Asynchronous JavaScript and XML." Ajax is not a programming language; it is a way of combining existing languages and technologies. Languages and technologies involved include JavaScript, XML, HTML, and the `XMLHttpRequest` object.

2.
    1) Fetching news updates periodically that update "live" on the page.
    2) Submitting a small amount of data, such as a forum message, in the background without leaving a page.
    3) Building Web 2.0 applications such as Gmail or Google Maps.

3. Synchronous communication is when a browser sends its request to a server and waits until the response is sent back, doing nothing in the interim. Asynchronous communication allows the browser to send a request, continue doing other work, and process the eventual response in the background while the current page is still visible. Ajax can use either style but most often uses asynchronous communication. This is helpful because it allows Ajax to create a more fluid browsing experience for many web sites and applications.

4. Microsoft created the original `XMLHTTP` object that was the inspiration for the W3C's modern standard-compliant object, `XMLHttpRequest`. Today every web browser supports Ajax and `XMLHttpRequest` except for outdated versions of Internet Explorer.

5. 5. The `onreadystatechange` property is an event that triggers when the request changes from being ready, to sending, to sent, and so on. It can be handled by a function that will react when the response arrives from the request. The `readyState` property tells your handler what state the request is currently in. The `status` property indicates what HTTP error code was returned by the request, which is helpful in determining whether the request was successful or had an error.

6. If the request is synchronous, once the request's .send method returns, the request will be complete. But in the more common asynchronous case, this is not the case. Instead, you must listen to the `onreadystatechange` event and handle it accordingly when its `readyState` equals 4, the magic number for a request that has completed.

7. Prototype provides an `Ajax.Request` object that eliminates many confusing and annoying aspects of the original `XMLHttpRequest` object, such as the `onreadystatechange` event, `readyState` property, and the strange division between the `open` and `send` functions. A

single statement can create and send an Ajax request with appropriate event handlers for when the request completes.

8. To specify an Ajax request's HTTP method in Prototype, set the `Ajax.Request` object's `method` option to a string such as `"get"` or `"post"`. (The default is `"post"`.)

9. `Ajax.Updater` implicitly uses the HTTP request's response text as a snippet of HTML to be inserted inside an element as its `innerHTML` content. It is useful when the Ajax request is to a page with a partial page of content to be inserted in a div or other element on the page.

10. Ajax code is not able to access information about the user's computer, nor read/write the user's hard drive. Ajax requests may not be made to any servers other than the server holding the web page currently being viewed in the browser. This is to prevent the leaking of sensitive information from one site to another through Ajax. If your program violates these restrictions, you will receive an exception your Ajax request.

11. XML is a specification for hierarchical markup languages using an HTML-like tagged syntax. The primary motivations for using XML are that it is a standardized and well understood format, therefore many developers and users are familiar with it, and many tools exist to parse and process XML data.

12. XHTML is an XML language with a given set of legal tags and attributes. XML is therefore a more general idea than XHTML; XHTML is but one of the many languages that can be created using XML. The syntaxes of XML and XHTML are essentially the same, except that XML documents begin with an XML prologue and are not restricted in terms of what tags and attributes may be used (unless a particular DTD or schema is specified for the document).

13. Schemas and DTDs describe a legal set of tags and attributes, along with legal structures and values for each. A given XML document may be validated against a schema or DTD to ensure that it matches its specifications. This is a way of ensuring that various XML documents are valid by the intentions of their creators.

14. XML data is fetched in JavaScript using Ajax, much like HTML or text data, except that the response's `responseXML` property is examined rather than `responseText`. The `responseXML` property represents the root of an XML DOM object tree corresponding to the tags and attributes of the original XML data in the document sent back by the request.

15. Every XML DOM object contains methods such as `getAttribute` and `getElementsByTagName`, and properties such as `parentNode`, `firstChild`, and `nextSibling`.

16.

```
var vehicles = ajax.responseXML.getElementsByTagName("vehicle");
if (vehicles.length > 0) {
  var model = vehicles[0].getAttribute("model");
  ...
}
```

Chapter 11: Relational Databases and SQL

1. A relational database is a set of data organized into tables, with rows representing records, columns representing data fields within each record, and relationships connecting tables to each other.

2. Another name for a table is a relation. Another name for a column is a field. Another name for a row is a tuple or record.

3. Commercial RDBMSs: Oracle (by Oracle), DB2 (by IBM), and SQL Server (by Microsoft). Open-source RDBMSs: PostgreSQL and MySQL.

4. `actors`, `movies`, `roles`, `movies_genres`
5. Regardless of the database system you use it should provide the ability to store and quickly query complex data sets. Additionally, database systems ensure that data is always left in a reliable state and allow thousands or even millions of users to concurrently access the data set at once.
6. In a declarative language like SQL, you describe to the computer what you want but not how to do it. In an imperative programming language such as Java, C, or JavaScript, you tell the computer exactly how to perform the desired computation step by step.
7. A SQL statement is made up of a number of clauses. Every clause begins with a SQL keyword.
8. The `SHOW DATABASES` statement allows you to view the databases you can query.
9. The `SHOW TABLES` statement allows you to view the tables in a database.
10. The query will return the last names of all actors that have a first name of 'Ed'.
11. The query will return all years from most to least recent in which there were movies with "star" somewhere in their title.
12.

```
SELECT *
FROM movies
WHERE name LIKE '__';
```

13.

```
SELECT first_name
FROM actors
WHERE last_name LIKE 'W%' AND gender = 'F';
```

14.

```
SELECT *
FROM movies
WHERE year > 2000 AND rank >= 7 AND rank <= 8;
```

15.

```
UPDATE actors
SET first_name = 'Jessica', last_name = 'Miller'
WHERE first_name = 'Brad' AND last_name = 'Pitt'
```

16. `mysql_connect` allows you to open a connection (i.e. access) to a database server, `mysql_select_db` allows you to select a database, and `mysql_query` allows you to query a database. `mysql_fetch_array` allows you to read results from your queries.
17. It is advantageous to use double-quoted strings for your PHP MySQL queries because they are interpreted strings and allow you insert PHP variables into the query as parameters to the SQL query.
18. To prevent SQL injection attacks `$_REQUEST["actor_name"]` should be encoded with the PHP function `mysql_real_escape_string`. The query string should appear all on the same line or use PHP string concatenation should be used to break up the query string on separate lines. The `$name` variable needs to be surrounded by single quotes.
19. The return type of `mysql_query` depends on the kind of SQL statement. If your query was a `SELECT` and the query was successful, `mysql_query` returns a PHP resource that allows us to access the query results. If there was an error, the function will return `FALSE`. If the SQL statement was an `INSERT`, `UPDATE`, or `DELETE`, the result will be `TRUE`

on success or FALSE on failure. To read results of a query, the result of mysql_query is passed to mysql_fetch_array.

20. The result returned by mysql_fetch_array is a single result row from the query or FALSE if there are no more rows available. The row is returned as an associative array. You can use column names to index into this associative array to get the values in each column of each row.

21. To debug the query you can: try the query in a MySQL console, check the syntax of the query in the PHP file, and store the query string in a variable and print it to the PHP page to make sure its parameters and syntax are correct.

22. A Cartesian product is all possible combinations of rows between all of the tables listed. If you do a Cartesian product between one table that has M rows and another table that has N rows, M x N results would be produced.

23. The query is a Cartesian product between movies and movie_genres – it does not take into account that we only want movies listed with their own genres (not with all possible genres for all movies). To fix it we should specify the ON keyword with the JOIN as shown below:

```
SELECT m.name, mg.genre
FROM movies m
    JOIN movies_genres mg ON m.id = mg.movie_id;
```

24. A join is a SQL operation that relates two or more tables, usually by means of values that are common between them.

25. A key is a column in a database table whose value must be unique for every row in the table. A primary key is the main column or group of columns that uniquely identify every row in a table. A foreign key is a column containing values from the primary key of another table.

26.

```
SELECT a.first_name, a.last_name
FROM actors a
    JOIN roles r ON a.id = r.actor_id
    JOIN movies_genres mg ON r.movie_id = mg.movie_id
WHERE gender = 'F' AND mg.genre = 'Thriller';
```

27.

```
SELECT d.first_name, d.last_name
FROM directors d
    JOIN directors_genres dg ON d.id = dg.director_id
WHERE dg.genre = 'Comedy'
ORDER BY dg.prob DESC;
```

28. The query returns the first and last names of all actors who have played themselves in a movie.

Chapter 12: Web 2.0 and Scriptaculous

(no self-checks)

Chapter 13: Going Live: Creating/Launching a Website

(no self-checks)