

Fundamental of Web Programming

MDN Curriculum

| | MDN Curriculum |
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| | Module-01: Getting Started |
| | Soft Skills |
| 01 | Constant Learning Mindset |
| 02 | Open to Embracing Failure |
| 03 | Effective Research |
| 04 | Collaboration and Teamwork |
| 05 | Succeeding in Job Interviews |
| 06 | Workflows and Processes |
| 07 | Relevant Contextual Information |
| | Environment Setup |
| 08 | Computer Basics |
| 09 | File Systems |
| 10 | Browsing the Web |
| 11 | Command Line Basics |
| 12 | Code Editors |
| | MDN Curriculum |
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| 02 | The HTML, CSS, and JavaScript Triangle |
| 03 | The Web Standards Model |
| 04 | How Browsers Load Webpages |
| | Semantic HTML |
| 05 | Basic HTML Syntax |
| 06 | Good Document Structure |
| 07 | Lists |
| 08 | Advanced Text Techniques |
| 09 | Links |
| 10 | Media |
| 11 | Other Interactive Elements |
| 12 | HTML Tables |
| 13 | Debugging HTML |
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| 14 | Basic CSS Syntax |
| 15 | Selectors |
| 16 | The Box Model |
| 17 | Handling Conflicts in CSS |
| 18 | Values and Units |
| 19 | Sizing |
| 20 | Backgrounds and Borders |
| 21 | Overflow |
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| 23 | Debugging CSS |
| | CSS Text Styling |
| 24 | Text and Font Styling |

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| 25 | Styling Lists and Links |
| 26 | Web Fonts |
| | CSS Layout |
| 27 | CSS Layout Basics |
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| 29 | Positioning |
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| | JavaScript Fundamentals |
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| 33 | Math |
| 34 | Text |
| 35 | Arrays |
| 36 | Conditionals |
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| 38 | Functions |
| 39 | JavaScript Object Basics |
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| 43 | Network Requests with (fetch()) |
| 44 | Working with JSON |
| 45 | Libraries and Frameworks |
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| | Accessibility |
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| 48 | Accessible Styling |
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| 50 | Assistive Technology |
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| 57 | Custom JS Objects |
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| 60 | Client-Side Storage |
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| 63 | Measuring Performance |
| 64 | CSS and Performance |
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| 72 | CSS Frameworks |
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| | Learn Web Development |
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| 02 | About Learn Web Development |
| 03 | Don't Know Where to Get Stated? |
| 04 | Getting Our Code Examples |
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| 06 | See Also |
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| 09 | Environment Setup |
| 10 | Your First Website |
| 11 | Web Standards |
| 12 | Soft Skills |
| | Module-01: Environment Setup |
| | Installing Basic Software |
| 13 | Overview: Environment Setup |
| 14 | Installing a Code Editor |
| 15 | Installing Modern Web Browsers |
| 16 | Installing a Local Web Server |
| 17 | What Tools Do The Professionals Use? |
| | Browsing The Web |
| 18 | How the Web Works: The Basics |
| 19 | The Difference Between Web Page, Website, Web Server, and Search Engine |
| 20 | Searching for Information |
| | Code Editors |
| 21 | What Code Editors are Available? |
| 22 | Basic Code Editor Functionality |
| 23 | Enhancing Your Code Editor with Extensions |
| | Dealing with Files |
| 24 | Where Should Your Website Live on Your Computer? |
| 25 | An Aside on Casing and Spacing |
| 26 | What Structure Should a Website Have? |
| 27 | File Paths |
| | Command Line Crash Course |
| 28 | Welcome to The Terminal |
| 29 | Basic Built-in Terminal Commands |
| 30 | Terminal – Considered Harmful? |
| 31 | Connecting Commands Together with Pipes |
| 32 | A Slightly More Complex Example |
| 33 | Adding Powerups |
| 34 | Other Tools to Play with |
| | Module-02: Your First Website |
| | What will Your Website Look Like? |
| 35 | First Things First: Planning |
| 36 | Sketching Out Your Design |
| 37 | Choosing a Theme Color |

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| 38 | Choosing an Image |
| 39 | Choosing a Font |
| | HTML: Creating the Content |
| 40 | So What is HTML? |
| 41 | Creating Your First HTML Document |
| 42 | Images |
| 43 | Marking up Text |
| 44 | Links |
| 45 | Conclusion |
| | CSS: Styling the Content |
| 46 | What is CSS? |
| 47 | Fonts and Text |
| 48 | CSS: All About Boxes |
| 49 | Conclusion |
| | JavaScript: Adding Interactivity |
| 50 | What is JavaScript? |
| 51 | A “Hello World!” Example |
| 52 | Language Basics Crash Course |
| 53 | Supercharging Our Example Website |
| 54 | Conclusion |
| | Publishing Your Website |
| 55 | What are the Options? |
| 56 | Publishing via GitHub |
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| | Module-03: Web Standards |
| | How the Web Works |
| 58 | Clients and Servers |
| 59 | The Other Parts of the Toolbox |
| 60 | So What Happens, Exactly? |
| 61 | Other in Which Component Files are Parsed |
| 62 | DNS Explained |
| 63 | Packets Explained |
| 64 | See Also |
| | The Web Standards Model |
| 65 | Brief History of the Web |
| 66 | Web Standards |
| 67 | Standards Bodies |
| 68 | The Web Standards Lifecycle |
| 69 | Overview of Modern Web Technologies |
| 70 | Web Best Practices |
| 71 | See Also |
| | How Browsers Load Websites |
| 72 | The Different Types of File Returned in an HTTP Response |
| 73 | Static Versus Dynamic Files |
| 74 | How Files are Assembled to Render a Web Document in the Browser |
| 75 | The Browser: Hostile Versus Awesome Programming Environment |
| | Module-04: Soft Skills |
| | Research and Learning |
| 76 | Effective Research |
| 77 | Constant Learning Mindset |
| 78 | See Also |

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| | Collaboration and Teamwork |
| 79 | Getting on with Others |
| 80 | Participate, Help People, Ask Questions |
| 81 | Learn to Embrace Failure |
| | Workflows and Processes |
| 82 | Typical Technology Combinations and Application Architectures |
| 83 | Typical Processes for a Technical Project |
| 84 | Typical Job Roles |
| 85 | Common Work Management |
| 86 | See Also |
| | Succeeding in Job Interviews |
| 87 | Effective Strategies for Job Searching |
| 88 | Developing Qualities for That Employers Look for |
| 89 | Finding Work Experience |
| 90 | Selling Yourself to Would-be Employers |
| 91 | Preparing Yourself for Job Interviews |
| 92 | See Also |

Front-End Development

MDN Core Modules: HTML

| | Core Modules |
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| | Core Modules |
| 01 | Prerequisites |
| 02 | Modules |
| 03 | Structuring Content with HTML |
| 04 | CSS Styling Basics |
| 05 | CSS Text Styling |
| 06 | CSS Layout |
| 07 | Dynamic Scripting with JavaScript |
| 08 | JavaScript Frameworks and Libraries |
| 09 | Accessibility |
| 10 | Design for Developers |
| 11 | Version Control |
| | Core Modules |
| | Module-01: Structuring Content with HTML |
| | Basic HTML Syntax |
| 01 | What is HTML? |
| 02 | Anatomy of an HTML Element |
| 03 | Attributes |
| 04 | Anatomy of an HTML Document |
| 05 | Character References: Including Special Characters in HTML |
| 06 | HTML Comments |
| 07 | Summary |
| 08 | See Also |
| | What's in the Head? Webpage Metadata |
| 09 | What is the HTML Head? |
| 10 | Adding a Title |
| 11 | Metadata: The <meta> Element |
| 12 | Adding Custom Icons to Your Site |
| 13 | Applying CSS and JavaScript to HTML |
| 14 | Setting the Primary Language of the Document |
| 15 | Summary |
| | Headings and Paragraphs in HTML |
| 16 | Headings and Paragraphs |
| 17 | Implementing Structural Hierarchy |
| 18 | Why do We Need Structure? |
| 19 | Active Learning: Giving Our Content Structure |
| 20 | Why Do We Need Semantics? |
| 21 | Summary |
| | Emphasis and Importance |
| 22 | What are Emphasis and Importance? |
| 23 | Active Learning: Let's Be Important |
| 24 | Italic, Bold, Underline ... |
| 25 | Summary |
| | Lists |
| 26 | Unordered Lists |
| 27 | Ordered |

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| 28 | Active Learning: Marking up Our Recipe Page |
| 29 | Nesting Lists |
| 30 | Description Lists |
| 31 | Test Your Skills |
| 32 | Summary |
| | Structuring Documents |
| 33 | Basic Sections of a Document |
| 34 | HTML for Structuring Content |
| 35 | HTML Layout Elements in More Detail |
| 36 | Planning a Simple Website |
| 37 | Summary |
| | Advanced Text Features |
| 38 | Quotations |
| 39 | Abbreviations |
| 40 | Marking up Contact Details |
| 41 | Superscript and Subscript |
| 42 | Representing Computer Code |
| 43 | Marking up Times and Dates |
| 44 | Test Your Skills |
| 45 | Summary |
| | Creating Links |
| 46 | What is a Hyperlink? |
| 47 | Anatomy of a Link |
| 48 | A Quick Primer on URLs and Paths |
| 49 | Link Best Practices |
| 50 | Active Learning: Creating a Navigation Menu |
| 51 | Email Links |
| 52 | Test Your Skills |
| 53 | Summary |
| | Challenge: Marking up a Letter |
| 54 | Starting Point |
| 55 | Project Brief |
| 56 | Hints and Tips |
| 57 | Example |
| | Challenge: Structuring a Page of Content |
| 58 | Starting Point |
| 59 | Project Brief |
| 60 | Hints and Tips |
| | HTML Images |
| 61 | How Do We Put an Image on a Webpage? |
| 62 | Media Assets and Licensing |
| 63 | Annotating Images with Figures and Figure Captions |
| 64 | CSS Background Images |
| 65 | Test Your Skills |
| 66 | Summary |
| | HTML Video and Audio |
| 67 | Video and Audio on the Web |
| 68 | The <Video> Element |
| 69 | Using Multiple Source Formats to Improve Compatibility |
| 70 | Other <video> Features |
| 71 | The <audio> Element |

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| 72 | Displaying Video Text Tracks |
| 73 | Active Learning: Embedding Your Own Audio and Video |
| 74 | Test Your Skills |
| 75 | Summary |
| | Challenge: Mozilla Splash Page |
| 76 | Starting Point |
| 77 | Project Brief |
| 78 | Hints and Tips |
| 79 | Example |
| | HTML Table Basics |
| 80 | What is a Table? |
| 81 | Active Learning: Creating Your First Table |
| 82 | Adding Headers with <th> Elements |
| 83 | Allowing Cells to Span Multiple Rows and Columns |
| 84 | Summary |
| | HTML Table Accessibility |
| 85 | Recap: Tables for Visually Impaired Users |
| 86 | Adding a Caption to Your Table with <caption> |
| 87 | Adding Structure with <thead>, <tbody> and <tfoot> |
| 88 | The (Scope) Attribute |
| 89 | The (Id) and (headers) Attributes |
| 90 | Active Learning: Playing with (scope and headers) |
| 91 | Summary |
| | Challenge: Structuring a Planet Data Table |
| 92 | Starting Point |
| 93 | Project Brief |
| 94 | Hints and Tips |
| 95 | Example |
| | Forms and Buttons in HTML |
| 96 | Buttons |
| 97 | Common Input Types |
| 98 | Accessible Forms |
| 99 | Other Control Types |
| 100 | Client-Side Form Validation |
| 101 | The <form> Element |
| 102 | Test Your Skills |
| 103 | Summary |
| | Debugging HTML |
| 104 | Debugging Isn't Scary |
| 105 | HTML and Debugging |
| 106 | Permissive Code |
| 107 | HTML Validation |
| 108 | Using a DOM Inspector |
| 109 | Summary |

| | Core Modules |
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| | Module-02: CSS Styling Basics |
| | What is CSS? |
| 01 | Browser Default Styles |
| 02 | What is CSS for? |
| 03 | CSS Syntax Basics |
| 04 | How is CSS Applied to HTML? |
| 05 | Summary |
| | Getting Started with CSS |
| 06 | Starting with Some HTML |
| 07 | Adding CSS to Our Document |
| 08 | Using Common Selectors |
| 09 | Other CSS Syntax Features |
| 10 | Summary |
| | Challenge: Styling a Biography Page |
| 11 | Project Brief |
| 12 | Hints and Tips |
| 13 | Example |
| | Basic CSS Selectors |
| 14 | What is a Selector? |
| 15 | Type Selectors |
| 16 | Class Selectors |
| 17 | ID Selectors |
| 18 | Selector Lists |
| 19 | The Universal Selector |
| 20 | Summary |
| | Attribute Selectors |
| 21 | Presence and Value Selectors |
| 22 | Substring Matching Selectors |
| 23 | Summary |
| | Pseudo-Classes and Pseudo-Element |
| 24 | What is a Pseudo-Class? |
| 25 | What is a Pseudo-Element? |
| 26 | Combining Pseudo-Classes and Pseudo-Elements |
| 27 | Generating Content with ::before and ::after |
| 28 | Summary |
| 29 | See Also |
| | Combinators |
| 30 | Descendant Combinator |
| 31 | Child Combinator |
| 32 | Next-Sibling Combinator |
| 33 | Subsequent-Sibling Combinator |
| 34 | Creating Complex Selectors with Nesting |
| 35 | Combining Combinators with Selectors |
| 36 | Test Your Skills |
| 37 | Summary |
| | The Box Model |
| 38 | Block and Inline Boxes |

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| 39 | Inner and Outer Display Types |
| 40 | Examples of Different Display Types |
| 41 | What is the CSS Box Model? |
| 42 | Playing with Box Models |
| 43 | Margins, Padding, and Borders |
| 44 | The Box Model and Inline Boxes |
| 45 | Using Display: Inline-Block |
| 46 | Test Your Skills |
| 47 | Summary |
| | Handling Conflicts |
| 48 | Conflicting Rules |
| 49 | Understanding Inheritance |
| 50 | Understanding the Cascade |
| 51 | The Effect of CSS Location |
| 52 | Test Your Skills |
| 53 | Summary |
| | CSS Values and Units |
| 54 | What is a CSS Value? |
| 55 | Numbers, Lengths, and Percentages |
| 56 | Color |
| 57 | Images |
| 58 | Position |
| 59 | Strings and Identifiers |
| 60 | Functions |
| 61 | Test Your Skills |
| 62 | Summary |
| | Sizing Items in CSS |
| 63 | The Natural or Intrinsic Size of Things |
| 64 | Setting a Specific Size |
| 65 | min- and max- sizes |
| 66 | Viewport units |
| 67 | Test Your Skills |
| 68 | Summary |
| | Backgrounds and Borders |
| 69 | Styling Backgrounds in CSS |
| 70 | Background Colors |
| 71 | Background Images |
| 72 | Gradient Backgrounds |
| 73 | Multiple Background Images |
| 74 | Background Attachment |
| 75 | Using the Background Shorthand Property |
| 76 | Accessibility Considerations with Backgrounds |
| 77 | Borders |
| 78 | Rounded Corners |
| 79 | Test Your Skills |
| 80 | Summary |
| | Overflowing Content |
| 81 | What is Overflow? |
| 82 | CSS Tries to Avoid “Data Loss” |
| 83 | The Overflow Property |
| 84 | Unwanted Overflow in Web Design |

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| 85 | Test Your Skills |
| 86 | Summary |
| | Images, Media, and Form Elements |
| 87 | Replaced Elements |
| 88 | Sizing Images |
| 89 | Replaced Elements in Layout |
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| 91 | Styling Text Input Elements |
| 92 | Normalizing Form Behavior |
| 93 | Test Your Skills |
| 94 | Summary |
| | Styling Tables |
| 95 | A Typical HTML Table |
| 96 | Getting Started with Styling Our Table |
| 97 | Spacing and Layout |
| 98 | Some Simple Typography |
| 99 | Graphics and Colors |
| 100 | Styling the Caption |
| 101 | Table Styling Quick Tips |
| 102 | Test Your Skills |
| 103 | Summary |
| | Debugging CSS |
| 104 | How to Access Browser DevTools |
| 105 | The DOM Versus View Source |
| 106 | Inspecting the Applied CSS |
| 107 | Editing Values |
| 108 | Adding a New Property |
| 109 | Understanding the Box Model |
| 110 | Solving Specificity Issues |
| 111 | Debugging Problems in CSS |
| 112 | Summary |
| 113 | See Also |
| | Challenge: Fundamental CSS Comprehension |
| 114 | Starting Point |
| 115 | Project Brief |
| 116 | Hints and Tips |
| 117 | Example |
| | Challenge: Creating Fancy Letter-Headed Paper |
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| 119 | Project Brief |
| 120 | Hints and Tips |
| 121 | Example |
| | Challenge: A Cool-Looking Box |
| 122 | Starting Point |
| 123 | Project Brief |
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| 125 | Example |
| | Module-03: CSS Text Styling |
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| 126 | What is Involved in Styling Text in CSS? |
| 127 | Fonts |

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| 128 | Text Layout |
| 129 | Font Shorthand |
| 130 | Active Learning: Playing with Styling Text |
| 131 | Summary |
| 132 | See Also |
| | Styling Lists |
| 133 | A Simple List Example |
| 134 | Handling List Spacing |
| 135 | List-Specific Styles |
| 136 | Controlling List Counting |
| 137 | Active Learning: Styling a Nested List |
| 138 | Summary |
| | Styling Links |
| 139 | Link States |
| 140 | Default Styles |
| 141 | Styling Links |
| 142 | Active Learning: Style Your Own links |
| 143 | Including Icons on Links |
| 144 | Styling Links As Buttons |
| 145 | Summary |
| | Web Fonts |
| 146 | Font Families Recap |
| 147 | Web Fonts |
| 148 | Active Learning: A Web Font Example |
| 149 | Using an Online Font Service |
| 150 | @font-face in More Detail |
| 151 | Summary |
| 152 | See Also |
| | Challenge: Typesetting a Community School Homepage |
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| 154 | Project Brief |
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| | Module-04: CSS Layout |
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| 158 | How are Elements Laid Out by Default? |
| 159 | Overriding Normal Flow |
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| | Floats |
| 161 | The Background of Floats |
| 162 | A (float) Example |
| 163 | Clearing (floats) |
| 164 | Clearing Boxes Wrapped Around a (float) |
| 165 | Test Your Skills |
| 166 | Summary |
| | Positioning |
| 167 | Introducing Positioning |
| 168 | Static Positioning |
| 169 | Relative Positioning |
| 170 | Absolute Positioning |

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| 171 | Fixed Positioning |
| 172 | Sticky Positioning |
| 173 | Test Your Skills |
| 174 | Summary |
| | Flexbox |
| 175 | Why Flexbox? |
| 176 | Introducing a Simple Example |
| 177 | Specifying What Elements to Lay Out As Flexible Boxes |
| 178 | The Flex Model |
| 179 | Columns or Rows? |
| 180 | Wrapping |
| 181 | (Flex-flow) Shorthand |
| 182 | Flexible Sizing of (flex) Items |
| 183 | Flex: Shorthand Versus Longhand |
| 184 | Horizontal and Vertical Alignment |
| 185 | Ordering (flex) Items |
| 186 | Nested (flex) Boxes |
| 187 | Test Your Skills |
| 188 | Summary |
| | CSS Grid Layout |
| 189 | What is Grid Layout? |
| 190 | Creating Your Grid in CSS |
| 191 | Line-Based Placement |
| 192 | Positioning with grid-template-areas |
| 193 | Nesting grids and subgrid |
| 194 | Grid Systems |
| 195 | Test Your Skills |
| 196 | Summary |
| 197 | See Also |
| | Responsive Design |
| 198 | Precursor to Responsive Design: Mobile Web Design |
| 199 | Introducing Responsive Web Design |
| 200 | Media Queries |
| 201 | Responsive Layout Technology |
| 202 | Responsive Images/Media |
| 203 | Responsive Typography |
| 204 | The (viewport) Meta Tag |
| 205 | Summary |
| 206 | See Also |
| | Media Query Fundamentals |
| 207 | Media Query Basics |
| 208 | More Complex Media Queries |
| 209 | How to Choose Breakpoints |
| 210 | Active Learning: Mobile First Responsive Design |
| 211 | The (viewport) Meta Tab |
| 212 | Do You Really Need a Media Query? |
| 213 | Test Your Skills |
| 214 | Summary |
| 215 | Challenge: Fundamental Layout Comprehension |
| 216 | Starting Point |
| 217 | Project Brief Hints and Tips Examples |

| | Core Modules |
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| | Module-05: Dynamic Scripting with JavaScript |
| | What is JavaScript |
| 01 | A High-Level Definition |
| 02 | So What Can It Really Do? |
| 03 | What is JavaScript Doing On Your Page? |
| 04 | How Do You Add JavaScript to Your Page? |
| 05 | Comments |
| 06 | Summary |
| | A First Splash Into JavaScript |
| 07 | Thinking Like a Programmer |
| 08 | Example- Guess The Number Game |
| 09 | Summary |
| | What Went Wrong? Troubleshooting JavaScript |
| 10 | Types of Error |
| 11 | An Erroneous Example |
| 12 | Fixing Syntax Errors |
| 13 | A logic Error |
| 14 | Other Common Errors |
| 15 | See Also |
| | Storing The Information You Need – Variables |
| 16 | Tools You Need |
| 17 | What is a Variable? |
| 18 | Declaring a Variable |
| 19 | Initializing a Variable |
| 20 | A Note About (var) |
| 21 | Updating a Variable |
| 22 | Variable Types |
| 23 | Dynamic Typing |
| 24 | Constants in JavaScript |
| 25 | When to Use (const) and When to Use (let) |
| 26 | Test Your Skills |
| 27 | Summary |
| | Basic Math in JavaScript – Numbers and Operators |
| 28 | Everybody Loves Math |
| 29 | Arithmetic Operators |
| 30 | Increment and Decrement Operators |
| 31 | Assignment Operators |
| 32 | Active Learning: Sizing a Canvas Box |
| 33 | Comparison Operators |
| 34 | Test Your Skills |
| 35 | Summary |
| | Handling Text – Strings in JavaScript |
| 36 | The Poser of Words |
| 37 | Declaring Strings |
| 38 | Embedding JavaScript |
| 39 | Multiline Strings |
| 40 | Including Quotes in Strings |

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| 41 | Numbers vs. Strings |
| 42 | Summary |
| | Useful String Methods |
| 43 | Strings as Objects |
| 44 | Finding the Length of a String |
| 45 | Retrieving a Specific String Character |
| 46 | Testing if a String Contains a Substring |
| 47 | Finding the Position of a Substring in a String |
| 48 | Extracting a Substring from a String |
| 49 | Changing Case |
| 50 | Updating Parts of a String |
| 51 | Active Learning Examples |
| 52 | Test Your Skills |
| 53 | Conclusion |
| | Arrays |
| 54 | What is an Array? |
| 55 | Creating Arrays |
| 56 | Finding the Length of an Array |
| 57 | Accessing and Modifying Array Items |
| 58 | Finding the Index of Items in an Array |
| 59 | Adding Items |
| 60 | Removing Items |
| 61 | Accessing Every Item |
| 62 | Converting Between Strings and Arrays |
| 63 | Active Learning: Printing Those Products |
| 64 | Active Learning: Top 5 Searches |
| 65 | Test Your Skills |
| 66 | Conclusion |
| | Challenge: Silly Story Generator |
| 67 | Starting Point |
| 68 | Project Brief |
| 69 | Steps to Complete |
| 70 | Hints and Tips |
| | Making Decisions in Your Code – Conditionals |
| 71 | You Can Have It On One Condition |
| 72 | If...else Statements |
| 73 | Switch Statements |
| 74 | Ternary Operator |
| 75 | Active Learning: A Simple Calendar |
| 76 | Active Learning: More Color Choices |
| 77 | Test Your Skills |
| 78 | Summary |
| 79 | See Also |
| | Looping Code |
| 80 | Why are Loops Useful? |
| 81 | Looping Through a Collection |
| 82 | The Standard (for) Loop |
| 83 | Exiting Loops with (break) |
| 84 | Skipping Iterations with Continue |
| 85 | (while) and (do...while) |
| 86 | Active Learning: Launch Countdown |

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| 87 | Active Learning: Filling in a Guest List |
| 88 | Which Loop Type Should You Use? |
| 89 | Test Your Skills |
| 90 | Summary |
| 91 | See Also |
| | Functions – Reusable Blocks of Code |
| 92 | Where Do I Find Functions? |
| 93 | Built-in Browser Functions |
| 94 | Functions Versus Methods |
| 95 | Invoking Functions |
| 96 | Function Parameters |
| 97 | Anonymous Functions and Arrow Functions |
| 98 | Function Scope and Conflicts |
| 99 | Test Your Skills |
| 100 | Summary |
| 101 | See Also |
| | Build Your Own Function |
| 102 | Active Learning: Let's Build a Function |
| 103 | The Basic Function |
| 104 | Calling the Function |
| 105 | Improving the Function with Parameters |
| 106 | Test Your Skills |
| 107 | Summary |
| | Function Return Values |
| 108 | What are Return Values? |
| 109 | Using Return Values in Your Own Functions |
| 110 | Active Learning: A Return Value Function |
| 111 | Now It's Your Turn |
| 112 | Test Your Skills |
| 113 | Conclusion |
| 114 | See Also |
| | Introduction to Events |
| 115 | What is an Event? |
| 116 | Using addEventListener() |
| 117 | Other Event Listener Mechanisms |
| 118 | Event Objects |
| 119 | Preventing Default Behavior |
| 120 | It's Not Just Web Pages |
| 121 | Summary |
| | Event Bubbling |
| 122 | Introducing Event Bubbling |
| 123 | Event Capture |
| 124 | Event Delegation |
| 125 | (target) and (currentTarget) |
| 126 | Test Your Skills |
| 127 | Summary |
| 128 | See Also |
| | Challenge: Image Gallery |
| 129 | Starting Point |
| 130 | Project Brief |
| 131 | Steps to Complete |

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| 132 | Declare an Array of Image (filenames) |
| 133 | Hints and Tips |
| | JavaScript Object Basics |
| 134 | Object Basics |
| 135 | Dot Notation |
| 136 | Bracket Notation |
| 137 | Setting Object Members |
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MDN Core Modules: Design

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Full-Stack Development

MDN Extension Modules: Advance JavaScript

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W3Schools: Database

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Database Design

➤ Beginning Database Design Solution, Rod Stephens

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| | Beginning Database Design Solution |
| | Part-01: Introduction to Database and Database Design |
| | Goals of Effective Database Design |
| | Understanding the Importance of Design |
| | Information Containers |
| | Strengths and Weakness of Information Containers |
| | Desirable Database Features |
| | Summary |
| | Exercises |
| | Database Types |
| | Why Bother? |
| | Flat Files |
| | Relational Database |
| | Spreadsheets |
| | Hierarchical Database |
| | XML |
| | Network |
| | Object |
| | Object-Relational |
| | Exotic |
| | Summary |
| | Exercises |
| | Relational Database Fundamentals |
| | Relational Points of View |
| | Table, Rows, and Columns |
| | Relations, Attributes, and Tuples |
| | Keys |
| | Indexes |
| | Constraints |
| | Database Operations |
| | Summary |
| | Exercises |
| | Part-02: Database Design Process and Techniques |
| | Understanding User Needs |
| | Make a Plan |
| | Bring a List of Questions |
| | Meet the Customers |
| | Learn Who's Who |
| | Pick the Customers' Brains |
| | Walk a Mile in the User's Shoes |
| | Study Current Operations |
| | Brainstorm |
| | Look to the Future |
| | Understand the Customers' Reasoning |
| | Learning What the Customers Really Need |
| | Prioritize |

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| | Verify Your Understanding |
| | Write the Requirements Document |
| | Make Use Cases |
| | Decide Feasibility |
| | Summary |
| | Exercises |
| | Translating User Needs into Data Models |
| | What are Data Models? |
| | User Interface Models |
| | Semantic Object Models |
| | Entity-Relationship Models |
| | Relational Models |
| | Summary |
| | Exercises |
| | Extracting Business Rules |
| | What are Business Rules? |
| | Identifying Key Business Rules |
| | Extracting Key Business Rules |
| | Multi-Tier Applications |
| | Summary |
| | Exercises |
| | Normalizing Data |
| | What is Normalization? |
| | First Normal Form (1NF) |
| | Second Normal Form (2NF) |
| | Third Normal Form (3NF) |
| | Stopping at Third Normal Form |
| | Boyce-Codd Normal Form (BCNF) |
| | Fourth Normal Form (4NF) |
| | Fifth Normal Form (5NF) |
| | Domain/Key Normal Form (DKNF) |
| | Essential Redundancy |
| | The Best Level of Normalization |
| | Summary |
| | Exercises |
| | Designing Databases to Support Software Applications |
| | Plan Ahead |
| | Document Everything |
| | Consider Multi-Tier Architecture |
| | Convert Domains into Tables |
| | Keep Tables Focused |
| | Use Three Kinds of Tables |
| | Use Naming Conventions |
| | Allow Some Redundant Data |
| | Don't Squeeze in Everything |
| | Summary |
| | Exercises |
| | Common Design Patterns |
| | Associations |
| | Temporal Data |
| | Logging and Locking |

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| | Summary |
| | Exercises |
| | Common Design Pitfalls |
| | Lack of Preparation |
| | Poor Documentation |
| | Poor Naming Standards |
| | Thinking Tool Small |
| | Not Planning for Change |
| | Too Much Normalization |
| | Insufficient Normalization |
| | Insufficient Testing |
| | Performance Anxiety |
| | Mishmash Tables |
| | Not Enforcing Constraints |
| | Obsession with IDs |
| | Not Defining Natural Keys |
| | Summary |
| | Exercises |
| | Part-03: A Detailed Case Study |
| | User Needs and Requirements |
| | Meet the Customers |
| | Pick the Customers' Brains |
| | Write Use Cases |
| | Write the Requirements Document |
| | Demand Feedback |
| | Summary |
| | Exercises |
| | Building a Data Model |
| | Semantic Object Modeling |
| | Entity-Relationship Modeling |
| | Relational Modeling |
| | Putting It All Together |
| | Summary |
| | Exercises |
| | Extracting Business Rules |
| | Identifying Business Rules |
| | Drawing a New Relational Model |
| | Summary |
| | Exercise |
| | Normalization and Refinement |
| | Improving Flexibility |
| | Verifying First Normal Form |
| | Verifying Second Normal Form |
| | Verifying Second Normal Form |
| | Verifying Third Normal Form |
| | Summary |
| | Exercises |
| | Part-04: Implementing Databases |
| | Microsoft Access |
| | Understanding Access |
| | Getting Started |

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| | Defining Relationships |
| | Creating Field Constraints |
| | Creating Table Constraints |
| | Crating Queries |
| | MySQL |
| | Installing MySQL |
| | Using MySQL Command Line Client |
| | Executing SQL Scripts |
| | Using MySQL Query Browser |
| | Using MySQL Workbench |
| | Summary |
| | Exercises |
| | Part-05: Advanced Topics |
| | Introduction to SQL |
| | Background |
| | Finding More Information |
| | Standards |
| | Basic Syntax |
| | Command Overview |
| | CREATE TABLE |
| | CREATE INDEX |
| | DROP |
| | INSERT |
| | SELECT |
| | UPDATE |
| | DELETE |
| | Summary |
| | Exercises |
| | Building Databases with SQL Scripts |
| | Why Bother with Scripts? |
| | Script Categories |
| | Ordering SQL Commands |
| | Summary |
| | Exercises |
| | Database Maintenance |
| | Backups |
| | Data Warehousing |
| | Repairing the Database |
| | Compacting the Database |
| | Performance Tuning |
| | Summary |
| | Exercises |
| | Database Security |
| | The Right Level of Security |
| | Passwords |
| | Privileges |
| | Initial Configuration and Privileges |
| | Too Much Security |
| | Physical Security |
| | Summary |
| | Exercises |

Software Requirements

- Requirements Engineering for Software and Systems, Phillip A. Laplante

| Requirements Engineering for Software and Systems |
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| Introduction to Requirements Engineering |
| Motivation |
| What is Requirements Engineering? |
| You Probably Don't Do Enough Requirement Engineering |
| What are Requirements? |
| Requirements Engineering Activities |
| Bodies of Knowledge |
| The Requirements Engineer |
| Requirements Engineer Roles |
| Role of the Customer |
| Problems with Traditional Requirements Engineering |
| Difficulties in Enveloping System Behavior |
| Exercises |
| References |
| Preparing for Requirements Elicitation |
| Production Mission Statement |
| Encounter with a Customer |
| Identifying the System Boundaries |
| Stakeholders |
| Customer Wants and Needs |
| Why Do Customers Change Their Minds? |
| Stakeholder Prioritization |
| Communicating with Customers and Other Stakeholders |
| Stakeholder Negotiations |
| Uncovering Stakeholder Goals |
| Exercises |
| References |
| Requirements Elicitation |
| Introduction |
| Preparing for Requirements Elicitation |
| Elicitation Techniques Survey – Topics 6 |
| Elicitation Techniques Survey – Topics 6 |
| Elicitation Techniques Survey – Topics 6 |
| Elicitation Techniques Survey – Topics 4 |
| Eliciting Nonfunctional Requirements |
| Elicitation Summary |
| Eliciting Hazards |
| Exercise |
| References |
| Writing the Requirements Document |
| Requirements Agreement and Analysis |
| Requirements Representation |
| ISO/IEC/IEEE Standard 29148 |
| UML/SysML |
| The Requirement Document – Topics ½ |

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| | The Requirement Document – Topics ½ |
| | Behavioral Specifications |
| | Best Practices and Recommendations |
| | Exercises |
| | Reference |
| | Requirements Risk Management |
| | What is Requirements Risk Management? |
| | Requirements Validation and Verification – Topics ½ |
| | Requirements Validation and Verification – Topics ½ |
| | Standards for V&V – Topics ½ |
| | Standards for V&V – Topics ½ |
| | NASA Requirements Testing – Topics ½ |
| | NASA Requirements Testing – Topics ½ |
| | Exercises |
| | Reference |
| | Formal Methods |
| | Motivation |
| | What Are Formal Methods? |
| | Examples – Topics 1/3 |
| | Examples – Topics 1/3 |
| | Examples – Topics 1/3 |
| | Objections, Myths, and Limitations |
| | Bowen and Hinchey’s Advice |
| | Exercises |
| | Reference |
| | Requirements Specification and Agile Methodologies |
| | Introduction to Agile Methodologies |
| | Extreme Programming |
| | Scrum |
| | Requirements Engineering for Agile Methodologies – Topics ½ |
| | Requirements Engineering for Agile Methodologies – Topics ½ |
| | Writing User Stories |
| | Agile Requirements Engineering |
| | Challenges for Requirements Engineering in Agile Methodologies |
| | Exercises |
| | Reference |
| | Tool Support for Requirements Engineering |
| | Introduction |
| | Traceability Support |
| | Requirements Management Tools |
| | Open-Source Requirements Engineering Tools |
| | Requirements Engineering Tool Best Practices |
| | Elicitation Support Technologies |
| | Requirements Metrics |
| | Exercises |
| | References |
| | Requirements Management |
| | Introduction |
| | Configuration Management and Control |
| | Reconciling Differences |
| | Expectation Revisited: Pascal’s Wager |

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| | Global Requirements Management |
| | Anti-patterns in Requirements Management – Topics ½ |
| | Anti-patterns in Requirements Management – Topics ½ |
| | Other Paradigms for Requirements Management |
| | Standards for Requirements Management |
| | Exercises |
| | References |
| | Value Engineering of Requirements |
| | What, Why, When, and How of Value Engineering |
| | Estimating Using COCOMO and Its Derivatives |
| | Estimating Using Function Points |
| | Requirements Feature Cost Justification – Topics ½ |
| | Requirements Feature Cost Justification – Topics ½ |
| | Putting It All Together |
| | Exercises |
| | References |
| | Appendix |
| | Software Requirements Specification for a Smart Home |
| | Software Requirements for a Wastewater Pumping Station Web Well Control System |
| | Unified Modeling Language (UML) |
| | User Stories |
| | Use Case |
| | IBM DOORS Requirements Management Tool |

Software Metrics

- Applied Software Measurement – Global Analysis of Productivity and Quality, Capers Jones

| Applied Software Measurement |
|---|
| Introduction |
| Applied Software Measurement |
| Planning and Estimation |
| Management and Technical Staffs |
| Organization Structures |
| Methodologies and Tools |
| The Office Environment |
| Reusability |
| The Essential Aspects of Applied Software Measurement |
| What Do Companies Measure? |
| Benchmarks and Industry Measures |
| Measurement and The Software Life Cycle |
| The Structure of a Full Applied Software Measurement System |
| The Sociology of Software Measurement |
| The Sociology of Data Confidentiality |
| The Sociology of Using Data for Staff Performance Targets |
| The Sociology of Measuring One-Person Projects |
| The Sociology of MIS vs. Systems Software |
| Justifying and Building an Applied Software Measurement Function |
| Applied Software Measurement and Future Progress |
| Suggested Readings |
| Additional Readings On Software Measurement and Metrics |
| The History and Evolution of Software Metrics |
| Evolution of the Software Industry and Evolution of Software Measurements |
| The Cons of Counting Function Point Metrics |
| The Paradox of Reversed Productivity of High-Level Languages |
| The Varieties of Functional Metrics Circa 2008 |
| Variations in Application Size and Productivity Rates |
| Future Technical Developments in Functional Metrics |
| Summary of and Conclusion About Functional Metrics |
| Software Measures and Metrics Not Based On Function Points |
| Suggested Readings on Measures and Metrics |
| United States Averages for Software Productivity and Quality |
| Sources of Possible Errors in the Data |
| Significant Software Technology Changes Between 1990 and 2008 |
| Changes in the Structure, Format, and Contents of the Third Edition |
| Variations in Software Development Practices Among Seven Sub-Industries |
| Ranges, Averages, and Variances in Software Productivity |
| The Impact of Technology ON Software Productivity and Quality Levels |
| Technology Warnings and Counter Indications |
| Using Function Point Metrics to Set “Best in Class” Targets |
| The Mechanics of Measurement: Building a Baseline |
| Software Assessments |
| Software Baselines |
| Software Benchmarks |

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| | What a Baseline Analysis Covers |
| | Developing or Acquiring a Baseline Data Collection Instrument |
| | Administering the Data Collection Questionnaire |
| | Analysis and Aggregation of the Baseline Data |
| | Suggested Readings |
| | Additional Readings |
| | Measuring Software Quality and User Satisfaction |
| | New Quality Information Since the Earlier Editions |
| | Quality Control and International Competition |
| | Defining Quality for Measurement and Estimation |
| | Five Steps to Software Quality Control |
| | Software Quality Control in the United States |
| | Measuring Software Defect Removal |
| | Measuring Defect Removal Efficiency |
| | Finding and Eliminating Error-Prone Modules |
| | Using Metrics to Evaluate Test-Case Coverage |
| | Using Metrics for Reliability Prediction |
| | Measuring the Costs of Defect Removal |
| | Evaluating Defect Prevention Methods |
| | Measuring Customer-Reported Defects |
| | Measuring Invalid Defects, Duplicate Defects, and Special Case |
| | Measuring User Satisfaction |
| | Combining User Satisfaction and Defect Data |
| | Summary and Conclusions |
| | Reading List |
| | Suggested Readings |
| | Additional References on Software Quality and Quality Measurements |
| | Measurements, Metrics, and Industry Leadership |
| | What Do Companies Measure? |
| | Measures and Metrics of Industry Leaders |
| | Measures, Metrics, and Innovation |
| | Measurements, Metrics, and Outsource Litigation |
| | Measurements, Metrics, and Behavioral Changes |
| | Topics Outside the Scope of Current Measurements |
| | Cautions Against Simplistic and Hazardous Measures and Metrics |
| | Commercial Software Measurement Tools |
| | Summary and Conclusions |
| | Suggested Readings on Measurement and Metrics |
| | Summary of Problems in Software Measurement |
| | Synthetic vs. Natural Metrics |
| | Ambiguity in Defining the Nature, Scope, Class, and Type of Software |
| | Ambiguity in Defining and Measuring the Activities and Tasks of Software Projects |
| | False Advertising and Fraudulent Productivity Claims |
| | The Absence of Project Demographic and Occupation Group Measurement |
| | Ambiguity in the Span of Control and Organizational Measurements |
| | The Missing Link of Measurement: When Do Projects Start? |
| | Ambiguity in Measuring Milestones, Schedules, Overlap, and Schedule Slippage |
| | Problems with Overlapping Activities |
| | Leakage from Software Project Resource Tracking Data |
| | Ambiguity in Standard Time Metrics |
| | Inadequate Undergraduate and Graduate Training in Software Measurement and Metrics |

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| | Inadequate Standards for Software Measurement |
| | Lack of Standardization of “Lines of Source Code” Metrics |
| | The Hazards and Problems of Ratios and Percentages |
| | Ambiguity in Measuring Development of Delivery Productivity |
| | Ambiguity in Measuring Complexity |
| | Ambiguity in Functional Metrics |
| | Ambiguity in Quality Metrics |
| | Ambiguity with the Defects Per KLOC Metric |
| | Ambiguity with the Cost per Defect Metric |
| | Failure to Measure Defect Potentials and Defect Removal Efficiency |
| | The Problems of Measuring the Impact of “Soft” Factors |
| | Problems in Measuring Software Value |
| | Lack of Effective Measurement and Metrics Automation |
| | Social and Political Resistance to Software Measurements |
| | Ambiguity in Software Measurement and Metrics Terminology |
| | Failure to Use Metrics for Establishing Goals and Targets |
| | Summary and Conclusions |
| | Suggested Readings |
| | Additional References on Software Measurements |
| | Appendix: Rules for Counting Procedural Source Code |
| | Project Source Code Counting Rules |
| | General Rules for Counting Code Within Applications |
| | Examples of the SPR Source Code Counting Rules |
| | Software Productivity Research COBOL-Counting Rules |

Statistics

➤ Statistics (A-Level), Sophie Goldie

| Applied Software Measurement |
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| S1 Statistics 1 |
| Exploring Data |
| Looking at the Data |
| Stem-and-Leaf Diagrams |
| Categorical or Qualitative Data |
| Numerical or Quantitative Data |
| Measures of Central Tendency |
| Frequency Distributions |
| Grouped Data |
| Measures of Spread (Variation) |
| Working with an Assumed Mean |
| Representing and Interpreting Data |
| Histograms |
| Measures of Central Tendency and of Spread Using Quartiles |
| Cumulative Frequency Curves |
| Probability |
| Measuring Probability |
| Estimating Probability |
| Expectation |
| The Probability of Either One Event or Another |
| Independent and Dependent Events |
| Conditional Probability |
| Discrete Random Variables |
| Discrete Random Variables |
| Expectation and Variance |
| Permutations and Combinations |
| Factorials |
| Permutations |
| Combinations |
| The Binomial Coefficients |
| Using Binomial Coefficients to Calculate Probabilities |
| The Binomial Distribution |
| The Binomial Distribution |
| The Expectation and Variance of $B(n, p)$ |
| Using the Binomial Distribution |
| The Normal Distribution |
| Using Normal Distribution Tables |
| The Normal Curve |
| Modeling Discrete Situations |
| Using the Normal Distribution as an Approximation for the Binomial Distribution |
| S2 Statistics 2 |
| Hypothesis Testing Using the Binomial Distribution |
| Defining Terms |
| Hypothesis Testing checklist |
| Choosing the Significance Level |

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| | Critical Values and Critical (rejection) Regions |
| | One-Tail and Two-Tail Tests |
| | Type 1 and Type 2 Errors |
| | The Poisson Distribution |
| | The Poisson Distribution |
| | Modelling with a Poisson Distribution |
| | The Sum of Two or More Poisson Distributions |
| | The Poisson Approximation to the Binomial Distribution |
| | Using the Normal Distribution as an Approximation for the Poisson Distribution |
| | Continuous Random Variables |
| | Probability Density Function |
| | Mean and Variance |
| | The Median |
| | The Mode |
| | The Uniform (rectangular) Distribution |
| | Linear Combinations of Random Variables |
| | The Expectation (Mean) of a Function of X, $E(g[X])$ |
| | Expectation: Algebraic Results |
| | The Sums and Differences of Independent Random Variables |
| | More Than Two Independent Random Variables |
| | Sampling |
| | Terms and Notation |
| | Sampling |
| | Sampling Techniques |
| | Hypothesis Testing and Confidence Intervals Using the Normal Distribution |
| | Interpreting Sample Data Using the Normal Distribution |
| | The Central Limit Theorem |
| | Confidence Intervals |
| | How Large a Sample Do You Need? |
| | Confidence Intervals for a Proportion |