1.29 Steve Jobs

1.31 $62 + 32 = 94$ printing characters

1.32 bit 6 from the right

1.33 **(a)** 897 **(b)** 564 **(c)** 871 **(d)** 2,199

CHAPTER 2

2.2 **(a)** x **(b)** x **(c)** y **(d)** 0

2.3 **(a)** B **(b)** $z(x + y)$ **(c)** $x'y'$ **(d)** $x(w + y)$ **(e)** 0

2.4 **(a)** $AB + C'$ **(b)** $x + y + z$ **(c)** B **(d)** $A'(B + C'A)$

2.9 **(a)** $xy + x'y'$

2.11 $F(x, y, z) = \Sigma(1, 4, 5, 6, 7)$

2.12 **(a)** 10100000 **(c)** 00011101 **(d)** 01001110

2.14 **(b)** $(x' + y')' + (x + y)' + (y + z')'$

2.15 $T_1 = A'(B' + C')$

$T_2 = A + BC = T_1'$

2.17 **(a)** $\Sigma(3, 5, 6, 7) = \Pi(0, 1, 2, 4)$

2.18 **(c)** $F = y'z + y(w + x)$

2.19 $\Sigma(1, 3, 5, 7, 9, 11, 13, 15) = \Pi(0, 2, 4, 6, 8, 10, 12, 14)$

2.22 **(a)** $AB + BC = (A + C)B$ **(b)** $x' + y + z'$

CHAPTER 3

3.1 **(a)** $xy' + x'z'$ **(b)** $xy' + z'$ **(c)** $x' + y'z$ **(d)** $x'y + x'z + yz$

3.2 **(a)** $x'y' + xz$ **(b)** $y + x'z$

3.3 **(a)** $xy + x'z'$ **(b)** $x' + yz$ **(c)** $z' + x'y$

3.4 **(a)** y **(b)** $BCD + A'BD'$ **(c)** $ABD + ABC + CD$

(d) $wx + w'x'y$

3.5 **(a)** $xz' + w'y'z + wxy$ **(d)** $BD + B'D' + A'B$ or $BD + B'D' + A'D'$

3.6 **(a)** $B'D' + A'BD + ABC'$ **(b)** $xy' + x'z + wx'y$

3.7 **(a)** $x'y + z$ **(c)** $AC + B'D' + A'BD + B'C$ (or CD)

3.8 **(a)** $F(x, y, z) = \Sigma(3, 5, 6, 7)$ **(b)** $F(A, B, C, D) = \Sigma(1, 3, 5, 9, 12, 13, 14)$

3.9 **(a)** Essential: xz and $x'z'$; Nonessential: $w'x$ and $w'z'$

(b) $F = B'D' + AC + A'BD + (CD$ **or** $B'C)$

3.10 **(c)** $F = BC' + AC + A'B'D$

Essential: BC', AC

Nonessential: AB, $A'B'D$, $B'CD$, $A'C'D$

3.11 **(a)** $F = A'B'D' + AD'E + B'C'D'$

3.12 **(b)** $F = (A + D')(B' + D')$

3.13 **(a)** $F = xy + z' = (x + z')(y + z')$

3.15 **(b)** $F = B'D' + CD' + ABC'D = \Sigma(0, 2, 6, 8, 10, 13, 14)$

3.17 $F' = AC' + BC' + BD$

3.19 **(a)** $F = (w + z')(x' + z')(w' + x' + y')$

3.30 $F = (A \oplus B)(C \oplus D)$

3.35 The HDL description is available on the Companion Website.

Line 1: Dash not allowed, use underscore: Exmpl_3.
Terminate line with semicolon (;).
Line 2: **inputs** should be **input** (no s at the end).
Change last comma (,) to semicolon (;). Output is declared but does not appear in the port list, and should be followed by a comma if it is intended to be in the list of inputs. If *Output* is a mispelling of **output** and is to declare output ports, C should be followed by a semicolon (;) and *F* should be followed by a semicolon (;).
Line 3: *B* cannot be declared as input (Line 2) and output (Line 3). Terminate the line with a semicolon (;).
Line 4: *A* cannot be an output of the primitive if it is an input to the module
Line 5: Too many entries for the not gate (only two allowed).
Line 6: OR must be in lowercase: change to "or".
Line 7: **endmodule** is mispelled. Remove semicolon (no semicolon after endmodule).

CHAPTER 4

4.1 **(a)** $F_1 = A + B'C + BD' + B'D$
$F_2 = A'B + D$

4.2 $F = ABC + A'D$
$G = ABC + A'D'$

4.3 **(b)** 1024 rows and 14 columns

4.4 **(a)** $F = x'y' + x'z'$

4.6 $F = xy + xz + yz$

4.7 **(a)** $w = A \quad x = A \oplus B \quad y = x \oplus C \quad z = y \oplus D$

4.8 $w = AB + AC'D'$