



Sheet 4

I Solve the following *Review Problems* from *Computer Science: An Overview*:

- **1.10**
Suppose a digital camera has a storage capacity of 256 MB. How many images can be stored in the camera if each image consists of 1024 pixels per row and 1024 pixels per column and each pixel requires three bytes of storage?
- **1.12**
 - a) Identify two advantages that main memory has over magnetic disk storage.
 - b) Identify two advantages that magnetic disk storage has over main memory.
- **1.15**
How many bytes of storage space are required to store a 400-page novel in which each page contains 3500 characters if ASCII is used? How many bytes are required if Unicode is used?
- **1.26**
Convert each of the following binary representations to its equivalent base ten representation:
a) 1111 b) 0001 c) 10101 d) 1000 e) 10011 f) 000000
g) 1001 h) 10001 i) 100001 j) 11001 k) 11010 l) 11011
- **1.27**
Convert each of the following base ten representations to its equivalent binary representation:
a) 7 b) 11 c) 16 d) 17 e) 31
- **1.34**
Convert each of the following binary representations into its equivalent base ten representation:
a) 11.11 b) 100.0101 c) 0.1101 d) 1.0 e) 10.01
- **1.35**
Express each of the following values in binary notation:
a) $5^3/4$ b) $15^{15}/16$ c) $5^3/8$ d) $1^1/4$ e) $6^5/8$
- **1.46**
What is the hexadecimal representation of the last memory address in a memory consisting of 4 MB if each cell has a four-byte capacity? What if the memory cell has a one-byte capacity?
- **1.52**
The following message was originally transmitted with odd parity in each short bit string. In which strings have errors definitely occurred?

11001 11011 10110 00000 11111 10001 10101 00100 01110

- **1.54**
Using the error-correcting code described below, decode the following words:

Character	Code
A	000000
B	001111
C	010011
D	011100
E	100110
F	101001
G	110101
H	111010

- a) 111010 110110
- b) 101000 100110 001100
- c) 011101 000110 000000 010100
- d) 010010 001000 001110 101111 000000 110111 100110
- e) 010011 000000 101001 100110



II Answer the following questions:

1. Using *run-length encoding*, compress the following message:

+++++++.....++++-----.....-----%%%%%%%%

2. Add the following four-bit binary numbers and identify when an overflow occurs:

a)	1100	b)	0111	c)	1011	d)	1010	e)	1100
	+		+		+		+		+
	0010		0111		0011		0110		0100

3. Give a definition/an example for each of the following:

- a) *RAM*
- b) *Mass Storage*
 - *Magnetic*
 - *Optical*
 - *Flash Technology*
- c) *Buffer*
- d) *ASCII*