CIS102 Solutions Test One

1. (a)

$$\begin{aligned}(1010101)_2 &= 1(64)+1(16)+1(4)+1(1)\\ &= (85)_{10}\end{aligned}$$

(b)

$$\begin{array}{cccccccc} \textit{Base}\ 2 & 1 & 1 & 0 & 1 & 0 \\ \times & & & 1 & 0 & 1 \\ \hline 1\,1\,0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ \hline 1\,0\,0\,0 & 0 & 0 & 1 & 0 \end{array}.$$

$$\begin{array}{cccccc} & & & {\scriptstyle 2} & & \\ 1 & 1 & 0 & 0 & 0 & \\ & - & 1 & 0 & 1 & \\ \hline 1 & 0 & 1 & 0 & 0 & \end{array}$$

2. (a) $A36 = 10(256)+3((15)+5(1) = 2560+48+6 = 2614$

(b) $A56+3B4 = E0A$

3. (a)

$0000:0$	$0100:4$	$1000:8$	$1100:C$
$0001:1$	$0101:5$	$1001:9$	$1101:D$
$0010:2$	$0110:6$	$1010:A$	$1110:E$
$0011:3$	$0111:7$	$1011:B$	$1111:F$

(b) $(0101/1011)_2 = (5B)_{16}$

$(C5.A)_{16} = 11000101.10$ in base two.

4. 199 from base ten to base two is

Column headings	128	64	32	16	8	4	2	1
	1	1	0	0	0	1	1	1

11000111

199 from base ten to base five is

Column headings:	125	25	5	1
	1	2	4	4

1244 in base five.

5. (a) A rational number is one which can be expressed in th4e form $\frac{m}{n}$ where m, n are integers and $n \neq 0$.

   (b) The decimal part of a rational number is finite or recurring. For example 2.4 or 3.121212....

   (c)

$$\begin{aligned} & & & 0.636363..... \\ & x & = & 0.636363..... \\ & 100x & = & 63.6363... \\ & x & = & 0.636363... \\ \text{subtract to get} \quad & 99x & = & 63 \\ & x & = & \frac{63}{99} = \frac{7}{11}. \end{aligned}$$

6.

$$\begin{aligned} 3.31 & < & \sqrt{11} < 3.32 \\ 3.315, & > & 3.3175 \text{ etc.} \end{aligned}$$

7.

$$\begin{aligned} & & 0.1625 \times 10^{-3} \\ 16250000 & = & 0.1625 \times 10^{8}. \end{aligned}$$