1. Conversion to base 10

a) 111110_2

$(0 \times 2^0) + (1 \times 2^1) + (1 \times 2^2) + (1 \times 2^3) + (1 \times 2^4) + (1 \times 2^5)$

$= 0 + 2 + 4 + 8 + 16 + 32$

$= 62_{10}$

b) 4532_8

$(2 \times 8^0) + (3 \times 8^1) + (5 \times 8^2) + (4 \times 8^3)$

$= 2394_{10}$

c) $14ACE_{16}$

A = 10 B = 11 C = 12 D = 13 E = 14 F = 15

$(14 \times 16^0) + (12 \times 16^1) + (10 \times 16^2) + (4 \times 16^3) + (1 \times 16^4)$

$= 84686_{10}$

d) $14, 57, 24, 10_{60}$

$(10 \times 60^0) + (24 \times 60^1) + (57 \times 60^2) + (14 \times 60^3)$

$= 3230650_{10}$

2. Explain what is wrong with the number 6823_8.

Answ. It is not an octal number; An octal number is the base-8 number system and uses the digits 0 to 7

3. Convert to the Indicated bases.

a) 38 to base 2.

	remainder
$38 \div 2 = 19$	0
$19 \div 2 = 9$	1
$9 \div 2 = 4$	1
$4 \div 2 = 2$	0
$2 \div 2 = 1$	0
$1 \div 2 = 0$	1

Picking the remainder going upwards;

$= 100110_2$

b) 111 to base 2.

	remainder
$111 \div 2 = 55$	1
$55 \div 2 = 27$	1
$27 \div 2 = 13$	1
$13 \div 2 = 6$	1
$6 \div 2 = 3$	0
$3 \div 2 = 1$	1
$1 \div 2 = 0$	1

Picking the remainder going upwards;

$= 1101111_2$

c) 1563 to base 8.

	remainder
$1563 \div 8 = 195$	3
$195 \div 8 = 24$	3
$24 \div 8 = 3$	0
~~$3 \div 8 =$~~	3

Picking the remainder going upwards;

$= 3033_8$

d) 1010 to base 8.

	remainder
$1010 \div 8 = 126$	2
$126 \div 8 = 15$	6
$15 \div 8 = 1$	7
$1 \div 8 = 0$	1

Picking the remainder going upwards;

$= 1762_8$

e) 321 to base 16

	remainder
$321 \div 16 = 20$	1
$20 \div 16 = 1$	4
$1 \div 16 = 0$	1

Picking the remainder going upwards

$= 141_{16}$

f) 1357 to base 16.

	remainder
$1357 \div 16 = 84$	13; D
$84 \div 16 = 5$	4
$5 \div 16 = 0$	5

$= 54D_{16}$

g) 12345 to base 60.

	60^2	60^1	60^0
$12345 \div 3600$	3	25	45
$= 3$ rem 1545			
$1545 \div 60$			
$= 25$ rem 45			

$= 3, 25, 45_{60}$

h) 11220 to base 60.

	60^2	60^1	60^0
$11220 \div 3600$	3	7	0
$= 3$ rem 420			
$420 \div 60$			
$= 7$ rem 0			

$= 3, 7, 0_{60}$

Part 2.

1. Add the following problems.

Note;
$2 = 10_2$
$3 = 11_2$
$4 = 100_2$
$5 = 101_2$
$6 = 110_2$.

a) $1110_2 + 1111_2$

11101_2

$= 11101_2$.

b) (i) $10111011_2 + 10101_2$

11010000_2

$= 11010000_2$.

(ii) $1011111_2 + 1111111_2$

11011110_2

$= 11011110_2$

Note;
A - 10
B - 11
C - 12
D - 13
E - 14
F - 15

b) $29BC_{16} + 4DA8_{16}$

7764_{16}

$= 7764_{16}$

b) $66EF_{16} + 24C_{16}$

$693B_{16}$

$= 693B_{16}$.

b) $66ABC_{16} + 1349E2_{16}$

$19B49E_{16}$

$= 19B49E_{16}$.

c) $7672_8 + 3364_8$

13256_8

$= 13256_8$

c) $52121_8 + 67517_8$

141640_8

$= 141640_8$.

c) $18754_8 + 67517_8$.

NOT APPLICABLE: 18754_8 is not an octal number.