

## Practical 2

### Number Representation

NOTE: Use of internet is not permitted, calculators are permitted and your answers must include worked solutions. If you require extra sheet(s) please write your name and student number at the top of each additional sheet.

## Part A

### Objective

Convert decimal numbers to binary showing in detail the conversion process

1. Convert the number of days in a leap year $366_{10}$ to $Base_2$						
$X_n$	Number	Count	Remainder	Running Total	Binary	Running Total
$2^8$	256	1	110	256	100000000	100000000
$2^7$	128	0	110	256	000000000	100000000
$2^6$	64	1	46	320	001000000	101000000
$2^5$	32	1	14	352	000100000	101100000
$2^4$	16	0	14	352	000000000	101100000
$2^3$	8	1	6	360	000001000	101101000
$2^2$	4	1	2	364	000000100	101101100
$2^1$	2	1	0	366	000000010	101101110
$2^0$	1	0	0	366	000000000	101101110
$366_{10}$ Binary <sup>2</sup> $101101110_2$						
2. Convert the number of available seats in the new Páirc Uí Chaoimh $45,000_{10}$ to $Base_2$						
$X_n$	Number	Count	Remainder	Running Total	Binary	Running Total
$2^{15}$	32768	1	12232	32768	100000000000000	100000000000000
$2^{14}$	16384	0	12232	32768	000000000000000	100000000000000
$2^{13}$	8192	1	4040	40960	001000000000000	101000000000000
$2^{12}$	4096	0	4040	40960	000000000000000	101000000000000
$2^{11}$	2048	1	1992	43008	000010000000000	101010000000000
$2^{10}$	1024	1	968	44032	000001000000000	101011000000000
$2^9$	512	1	456	44544	000000100000000	101011100000000
$2^8$	256	1	200	44800	000000010000000	101011110000000
$2^7$	128	1	72	44928	000000001000000	101011111000000
$2^6$	64	1	8	44992	000000000100000	101011111100000
$2^5$	32	0	8	44992	000000000000000	101011111100000
$2^4$	16	0	8	44992	000000000000000	101011111100000
$2^3$	8	1	0	45000	0000000000001000	1010111111001000
$2^2$	4	0	0	45000	0000000000000000	1010111111001000

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$2^1$	2					
$2^0$	1					

**Part B**

**Objective**

Convert numbers base<sub>n</sub> to hexadecimal showing in detail the conversion process

1. Convert the number $181336782_{10}$ to Base <sub>16</sub>
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$2^1$	2	0	0	45000	0000000000000000	1010111111001000
$2^0$	1	0	0	45000	0000000000000000	1010111111001000

$45000^{10}$

Binary<sup>2</sup>

$1010111111001000^2$

2. Convert the number  $C0FF.EE_{16}$  to  $Base_{10}$  directly

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**Part C**

**Objective**

Convert numbers  $\text{base}_n$  to  $\text{base}_n$  showing in detail the conversion process

1. What is the $\text{Base}_{16}$ value of 8 bit 2's complement number $1001\ 0101_2$
2. Subtract $13_{10}$ from $42_{10}$ using 8 bit 2's complement and convert to $\text{Base}_8$

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### Number Representation

#### Part D

##### Objective

Convert numbers base<sub>n</sub> to hexadecimal showing in detail the conversion process

1. Add  $-32_{10}$  to  $61_{10}$  using 8 bit 2's complement

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2. Add  $-4_{10}$  to  $46_{10}$  using 8 bit 2's complement

Hand up this practical report at the end of session and ensure it has been checked

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<b>Student Name</b>		<b>Student Number</b>	
<b>Date</b>		<b>Checked</b>	
<b>Group</b>	<b>A / B</b>		