

## Math-42 Worksheet #14

### Integer Representations and Algorithms

1. Convert decimal 1000 to:

- (a) Binary
- (b) Base 3
- (c) Octal
- (d) Hexadecimal

2. Convert to decimal:

- (a)  $101110110_2$
- (b)  $12012021_3$
- (c)  $17352_8$
- (d)  $1CF3_{16}$

3. Complete the following table:

BINARY	OCTAL	DECIMAL	HEXADECIMAL
1011011110			
	175264		
		65536	
			F19A

4. Is 157834 a valid octal number? Why or why not?

5. Complete the following addition and multiplication tables using the base suggested by the number of digits—they will be helpful for the following exercise.

+	0	1
0		
1		

·	0	1
0		
1		

+	0	1	2
0			
1			
2			

·	0	1	2
0			
1			
2			

+	0	1	2	3	4	5	6	7
0								
1								
2								
3								
4								
5								
6								
7								

·	0	1	2	3	4	5	6	7
0								
1								
2								
3								
4								
5								
6								
7								

+	0	1	2	3	4	5	6	7	8	A	B	C	D	E	F
0															
1															
2															
3															
4															
5															
6															
7															
8															
9															
A															
B															
C															
D															
E															
F															

·	0	1	2	3	4	5	6	7	8	A	B	C	D	E	F
0															
1															
2															
3															
4															
5															
6															
7															
8															
9															
A															
B															
C															
D															
E															
F															

6. Perform the following operations in the specified bases:

(a)  $1101010111_2 + 100010110_2$

(b)  $1101010111_2 \cdot 10110_2$

(c)  $2210120_3 + 1102_3$

(d)  $2210120_3 \cdot 1102_3$

(e)  $17534_8 + 61234_8$

(f)  $17534_8 \cdot 6102_8$

(g)  $F10A3_{16} + 1DC29_{16}$

(h)  $F10A3_{16} \cdot 20C_{16}$

7. Use fast exponentiation to calculate the following:

(a)  $7^{100} \bmod 321$

(b)  $13^{300} \bmod 209$