CS1021 Tutorial #1 Solution
Information Storage Units and Numeral Systems

1 Numeral Systems

(a) (i) 10^1 or 10

   (ii) 10^2 or 100

   (iii) 10^4 or 10,000

(b) (i) 2^4 or 16

   (ii) 2^7 or 128

   (iii) 2^{12} or 4,096

(c) (i) 16^1 or 16

   (ii) 16^4 or 65,536

   (iii) 16^6 or 16,777,216

(d) (i) 2^{16} or 65,536

   (ii) $0 \ldots 2^{16} - 1$ or $0 \ldots 65,535$

   (iii) 2^{32} or 4,294,967,296

   (iv) $0 \ldots 2^{32} - 1$ or $0 \ldots 4,294,967,295$

(e) (i) 10

   (ii) 166

   (iii) 255

   (iv) 128

(f) (i) 1001

   (ii) 1000000

   (iii) 111111

(g) (i) 7

   (ii) A

   (iii) 9C

    (iv) 26

  (h) (i) 1111 1111 1111 1111

    (ii) 1010 0000 1000 1100

    (iii) 0100 1111 0001 1110 0000 1000 0000 1100

  (i) (i) 10

    (ii) 11

2   Units of Information Storage

  (a) (i) 1,024

    (ii) 1,048,576

    (iii) 4,718,592

    (iv) 134,217,728 (or $16 \times 2^{20} \times 8$)

  (b) (i) 256

    (ii) 262,144

    (iii) 255

  (c) 921,600B or 900kB

3   Memory Addresses

0x2054

4   ARM Assembly Language

```
     ADD  R0,  R1,  R2          ;  x + y
```

```
     SUB  R0,  R2,  R1          ;  y - x
```

```
     MUL  R0,  R1,  R1          ;  x^2
```

```
     LDR  R3,  =5
     MUL  R0,  R2,  R3          ;  5 y
```

```
1    LDR  R3 ,  =3
2    MUL  R0 ,  R1 ,  R3        ;  3x
3    ADD  R0 ,  R0 ,  R2        ;  +y
```