COMP2100 Workshop Week 2

1. Powers of two. Each of these questions should be answered by using the powers of two as shown in the table. You also need to remember: kilo, Mega, Giga, Tera, Peta, Exa.

k	2^k	k	2^k
0	1	6	64
1	2	7	128
2	4	8	256
3	8	9	512
4	16	10	1024
5	32		

   a. What is 2^{16} approximately?

   b. What power of two is approximately 4 000 000 000 (4 G)? Why is this number significant?

   c. If a user has 30000 images stored on disk, and each image is 4 MiB, how much disk space do these images take up, approximately? Don't use a calculator – use the powers of two to compute an approximate answer.

   d. Australian Internet traffic totals 570 Peta Bytes per month as at December 2015 (http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0) . With 13 million Internet subscribers in Australia, what is the average data rate in bytes per second per Internet subscriber?

2. Primitive data types in C
   a. Write declarations of four signed integers, ranging in size from a single byte to a long integer. What is the size of each integer when compiled with gcc –m64?

   b. Declare a 64 bit floating point number initialized with the value of pi: 3.1415926535897932.

   c. Declare a character array initialized with the string "COMP2100". What is the size of the array?
      i. Show the contents of each byte in the array.
      ii. Write C program to print out the ASCII value of each byte in the array as:
         1. decimal numbers
         2. octal numbers
         3. hexadecimal numbers

   d. What is the difference between the C integer constants `0` and `'0'` ?

3. Short pieces of C code. Consider the following C code segment.

```
int length;
char str[] = "some string";
```

   a. Write a loop to compute the number of characters in `str` using
      i. the `while` statement

      ii. the `for` statement

   ** Do not use any additional variables.*

   b. Test out the following. Explain what they do.
      i. `while (1) { printf("Hello!"); }`

      ii. `for ( ; str[1]; ) { printf("foo\n"); }`

      iii. `for (int i = 0; str[i]; ) { printf("%c", str[i++]); }`

      iv. `while (1-1) { printf("Welcome to COMP2100!\n"); }`

      v. `while (-32787) { printf("%s\n", str); }`