THE UNIVERSITY OF MELBOURNE
DEPARTMENT OF COMPUTING AND INFORMATION SYSTEMS

MID-SEMESTER TEST SAMPLE ANSWER – SEMESTER 2, 2016
COMP20005 ENGINEERING COMPUTATION

Total marks for this Exam: 10

Reading Time: **5** minutes
Writing Time: **30** minutes

This exam has 4 pages.

Identical Examination Papers: None
Common Content Papers: None

Authorised Materials:
Writing materials, e.g., pens, pencils, are allowed.
Books, calculators, and dictionaries are not allowed.

Instructions to Students:
- Answer all questions.
- Clearly write your answers. Any unreadable answer will be considered wrong.

1. [3 marks] Write out the values of the three variables x, y, and z after lines 2, 5, and 7 of the following program have been executed (or bypassed by the execution flow).

```
0:      int
1:      main(int argc, char *argv[]) {
2:              int x = 3, y = 4, z = 5;
3:              if (x > 2)
4:                      if (y > 4)
5:                              x = y; y = z; z = 6;
6:              else
7:                      x = y; y = z; z = 7;
8:              return 0;
9:      }
```

After line 2: x = 3, y = 4, z = 5
After line 5: x = 3, y = 4, z = 5
After line 7: x = 4, y = 5, z = 7

2. [4 marks] Consider the following program execution:

```
mac:./starTriangle
Enter an integer: abc
Input invalid. Program exiting…
mac:./starTriangle
Enter an integer: 3
*
**
***
mac:
```

This program reads an integer n, and then prints a triangle with n rows of '*' characters. Complete the following program to implement the above process. You can declare more variables if necessary.

```
/* Program to print a '*' triangle */
#include <stdio.h>
#include <stdlib.h>
int
main(int argc, char **argv) {
  int n;
```

int i, j;
printf("Enter an integer: ");
if (scanf("%d", &n) != 1) {
printf("Input invalid. Program exiting…\n");
exit(EXIT_FAILURE);
}
for (i = 0; i < n; i++) {
for (j = 0; j <= i; j++) {
printf("*");
}
printf("\n");
}

```
  return 0;
}
```

3. [3 marks] Write a function int count_factors(int n) that calculates and returns the number of factors, including 1 and itself, of the argument variable n.

For example, the call count_factors(15) should return 4 (factors of 15 being 1, 3, 5, and 15). You may assume n > 0.

```
int
count_factors(int n) {
   int i, counter;
   counter = 0;
   for (i = 1; i <= n; i++) {
      if (n % i == 0) {
         counter++;
      }
   }
   return counter;
}
```

End of sample exam