Family Name: ..... **Other Names:** .....

ID Number: ..... **Signature** .....

ENGR 101: Test 2

6 June, 2018

Instructions

- Time allowed: **50 minutes** .
- Answer **all** the questions. There are 44 marks in total.
- Write your answers in the boxes in this test paper and hand in all sheets.
- If you think some question is unclear, ask for clarification.
- This test contributes 20% of your final grade
- You may use paper translation dictionaries, and calculators without a full set of alphabet keys.
- You may write notes and working on this paper, but make sure your answers are clear.

Questions	**Marks**	
3. Software Quality and Testing	[9]	
4. C programming	[6]	
5. Error signals, Control systems and PID	[8]	
	TOTAL:	

SPARE PAGE FOR EXTRA ANSWERS

Cross out rough working that you do not want marked.
Specify the question number for work that you do want marked.

==========

1. Software Quality and Testing **(9 marks)**

   There are 6 measures of software quality:

   1. Correctness
   2. Efficiency
   3. Fault Tolerant
   4. Maintainable
   5. Secure
   6. User-friendly

   (a) **(3 marks)** Which two measures you think are more important for:

   Phone computer game for children:

   Self-driving car software:

   (b) **(2 marks)** Can testing guarantee that there are no more bugs left in the program? Explain.

   (c) **(2 marks)** Should **unit** testing or **regressive** testing should be done first? Explain your answer.

(d) **(2 marks)** What is the difference between **white** box testing and **black** box testing? Which is likely to be done by programmer?

2. C programming **(6 marks)**

(a) **(4 marks)**

What is an output of the program:

```
#include <stdio.h>
int main(){
  int a[9];
  for (int i = 0 ; i < 9; i=i+1){
    a[i] = i;
  }
  for (int i = 0 ; i < 10; i=i+1){ //oops
     printf(" %d ",a[i]);
  }

}
```

Explain your answer.

(b) **(2 marks)** Which of the following is a logical OR operator?

A - &

B - &&

C - ||

D - None of the above

3. Error signals, Control Systems and PID **(8 marks)**

(a) **(2 marks)** What are A,B and C components of control system as shown at picture below called?

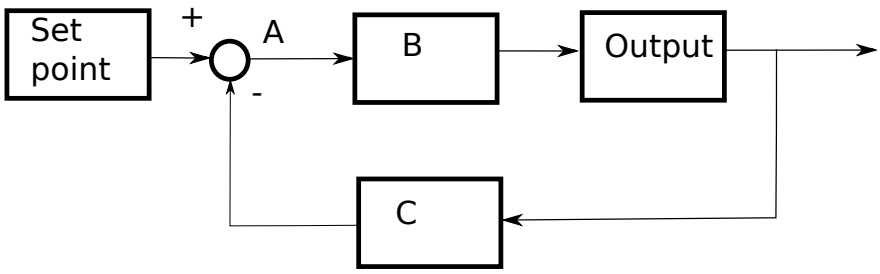

Figure 1:

(b) **(2 marks)** Propose at least two error signals for automatic airplane landing system.

(c) **(2 marks)** If your system exhibits excessive oscillations, should you reduce or increase value of Kp? Justify your answer.

(d) **(2 marks)** What are advantages of using PID controller instead of ”ON”-”OFF” system.

SPARE PAGE FOR EXTRA ANSWERS

Cross out rough working that you do not want marked.
Specify the question number for work that you do want marked.

* * * * * * * * * * * * * * *