

# EE-562 : Robot Motion Planning

## Problem Set # 1

Spring 2013-14

Due Date : Jan 27, 2014.  
Total Points : 100.

### **Problem 1 (20 Points)**

Which of the following can be considered as Robots according to the definition we studied in the course. Give a brief explanation of your answer and state any assumption you are taking.

1. Smoke detectors
2. Street Lights installed in LUMS that turn on when someone is passing by
3. flight scheduling system
4. drones used for target killings
5. ATM machine

### **Problem 2 (20 Points)**

Which of the following can be considered as Motion Planning Problem according to the definition we studied in the course. Give a brief explanation of your answer and state any assumption you are taking.

1. opening a lock with a key
2. following a person who is finding his way to a classroom.
3. avoiding an incoming car on a highway
4. cleaning a floor
5. deciding whether you should take 2 or 3 run after hitting a ball in cricket

### **Problem 3 (20 Points)**

Give examples (different from those given in the textbook) for each of the following situation.

1. Bug0 fails.
2. Bug1 beats Bug2.
3. Bug2 beats Bug1.

### **Problem 4 (20 Points)**

Look up Jordan's curve theorem. Use this theorem to prove that the Bug1 algorithm is complete. (**Hint.** See book slides for a sketch of the proof.)

### **Problem 5 (20 Points)**

Prove that Tangent bug algorithm is complete or not.