# Legged Robotics

HW #6

Problem 1 – 50 pts.

Watch the following video from YouTube and accurately draw two kinematic phase diagrams: one for the running gait and one for the walking gait that you see in the video. Name each gait.

https://www.youtube.com/watch?v=lUyMbtR5qH4

Problem 2 – 25 pts.

Consider a hexapod robot with six identical legs and the configuration shown in the following figure.
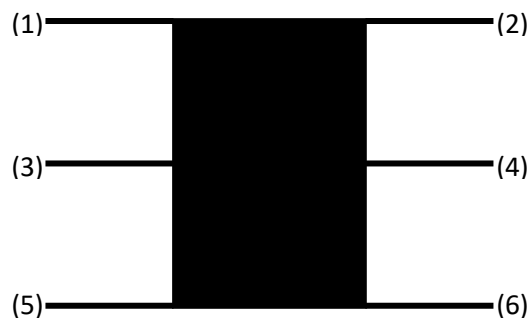
If we want the robot to walk with an average constant velocity of $0.01 \ m/s$ with a duty factor of $\beta = \frac{4}{6}$, stride length of $= 0.03 \ m$,

1) Write down the average velocity of swing (transferring) legs with respect to the **body**. (5 point)
2) Write down the average velocity of swing (transferring) legs with respect to the **ground**. (5 points)
3) Draw the kinematic phase diagram. How many legs are in contact with ground (support phase) when walking? (5 point)
4) Write down the relative kinematic phase of each leg. (5 point)
5) How long is one cycle time period in seconds? (5 point)

Problem 3 – 25 pts.

Referring to Paper 6, please explain your understanding of Figure 7. For this open-ended problem, I need your detailed analysis and comparison of the four stability criteria. Conclude your observation.

Good Luck!