

Problem 4: Spot and Shadow

USMA D/Math Problem of the Week

Submission Deadline: October 11, 2007 at 1600

Circle one: cadet faculty non-usma student non-usma faculty other

Problem Statement: Spot and Shadow are two puppies playing in a large circular dog park. Spot, named for a patch of brown hair on his side, is sitting at the precise center of the park guarding a bone, while the sprightly Shadow waits at some other location within the park.

At time 0, both begin to move from their location, with Spot chasing Shadow and Shadow doing his best to run away. What strategy should Spot follow in order to *guarantee* that (i) his bone is kept safe and (ii) he catches Shadow in finite time? Assume that both dogs have the same top speed and that there are no maneuverability constraints. A valid logical argument is sufficient.

Submit your answer to Dr. Elisha Peterson at ae3263@usma.edu as an attachment to your email, with the subject line **WP POTW**. Or drop your solution off in my mailbox or on my desk (with date and time please!)