Name: _____

ASTR500: Mock Cumulative Exam Question #1
*Color Confirmation of Asteroid Families (Ivezic et al. 2002)*
$20^{th}$ January, 2009 – Jeff Coughlin

The authors discuss the fact that for newly discovered moving objects, SDSS observations are taken only 5 minutes apart, and thus provide an insufficient baseline for accurate determination of orbital parameters. Given that the field of view of the Sloan telescope is 2.5 degrees on a side and assuming the telescope takes an image of the same field every night, how many total nights worth of images would it take to observe an asteroid with a semi-major axis of $a = 2.0$ AU, an eccentricity $e = 0.0$, and a current distance from the Earth of 1.0 AU, (i.e., closest approach) pass through at least half the field?

You may use the small angle approximation, ignore any inclination effects, and ignore the motion of the Earth (i.e., assume the Earth is stationary).