AE 262 DYNAMICS

2013-2014 SPRING SEMESTER

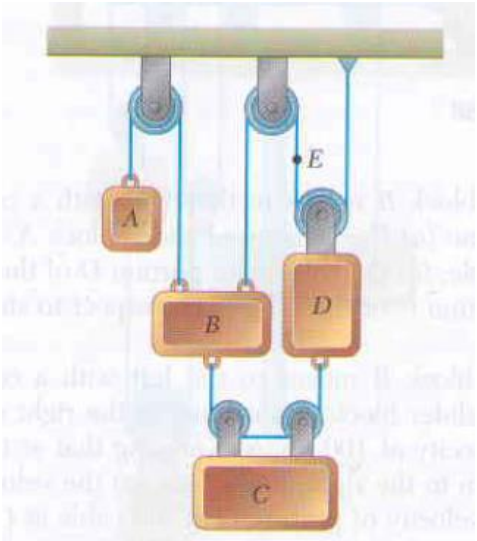
HOMEWORK #1

Given: 27.02.2014

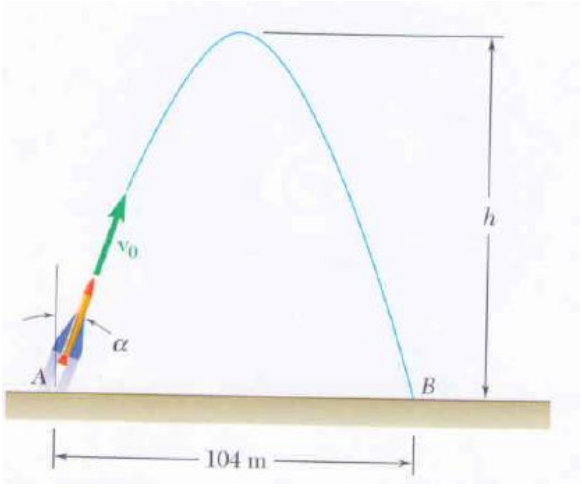
Due: 10.03.2014 at 17.30

Submit to: Tuğçe Garip

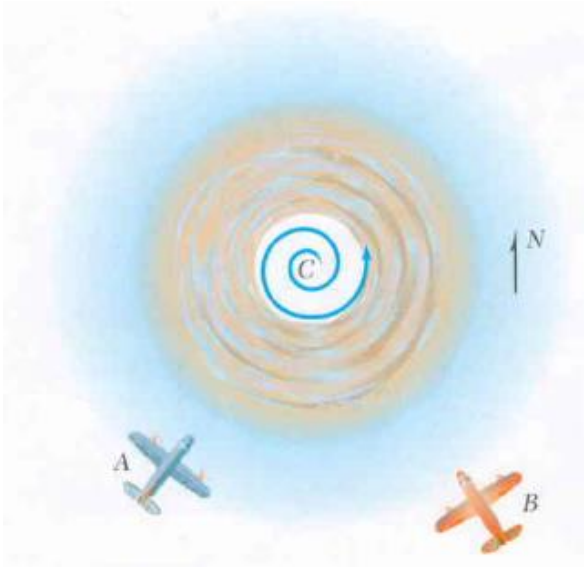
Q.1) Block C starts from rest and moves downward with a constant acceleration. Knowing that after 5 s the velocity of block *A* relative to block *D* is 2.4 m/s, determine ***(a)*** the acceleration of block *C*, ***(b)*** the acceleration of portion E of the cable.



Q.2) A model rocket is launched from point *A* with an initial velocity v_0 of 86 m/s. If the rocket's descent parachute does not deploy and the rocket lands 104 m from *A*, determine ***(a)*** the angle α that v_0 forms with the vertical, ***(b)*** the maximum h reached by the rocket, ***(c)*** the duration of flight.



Q.3) Airplanes *A* and *B* are flying at the same altitude and are tracking the eye of hurricane *C*. The relative velocity of *C* with respect to *A* is $v_{C/A}$=470 km/h 75^{o} , and relative velocity of *C* with respect to *B* is $v_{C/B}$=520 km/h 40^{o}. Determine ***(a)*** the relative velocity of *B* with respect to *A*, ***(b)*** the velocity of A if ground-based radar indicates that the hurricane is moving at a speed of 48 km/h due north, ***(c)*** the change in position of *C* with respect to *B* during a 15-min interval.



Q.4) The rotation of rod OA about O is defined by the relation $\Theta = 0.5e^{-0.8t}\sin 3\pi t$, where Θ and t are expressed in radians and seconds, respectively. Collar *B* slides along the rod so that its distance from O is $r=1+2t-6t^2+8t^3$, where r and t are expressed in meter and seconds, respectively. When t=0.5 s, determine ***(a)*** the velocity of the collar, ***(b)*** the acceleration of the collar, ***(c)*** the acceleration of the collar relative to the rod.