Name _____ Section _____

ES204
Examination I
December 15, 2006

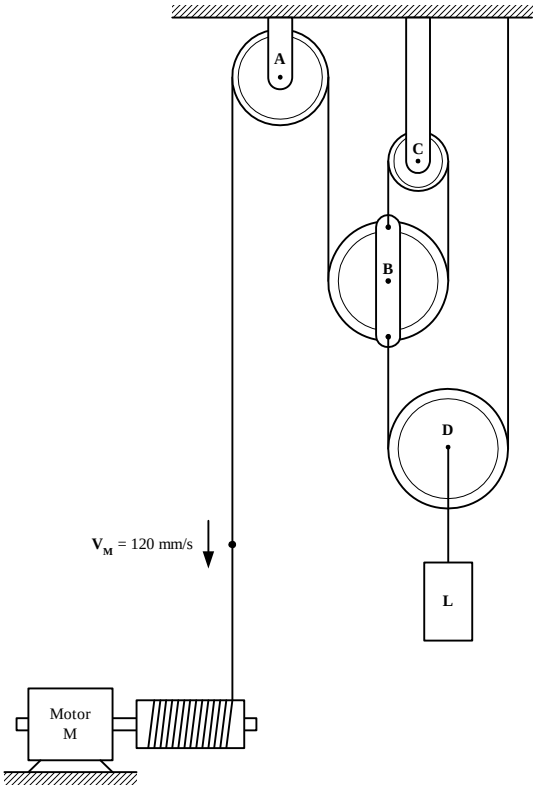
Problem	Score
1	/15
2	/15
3	/30
4	/40
Total	/100

Show all work for credit
AND
Turn in your signed help sheet
AND
Stay in your seat until the end of class

Name _____ 15 pts

ES204 Examination I **Problem 1** Dec. 15, 2006

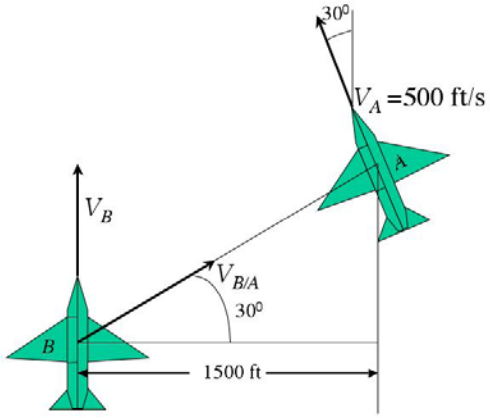
Determine the velocity of load L if motor M reels in the cable at a constant rate of 120 mm/s.



Name _____ 15 pts

ES204 Examination I **Problem 2** Dec. 15, 2006

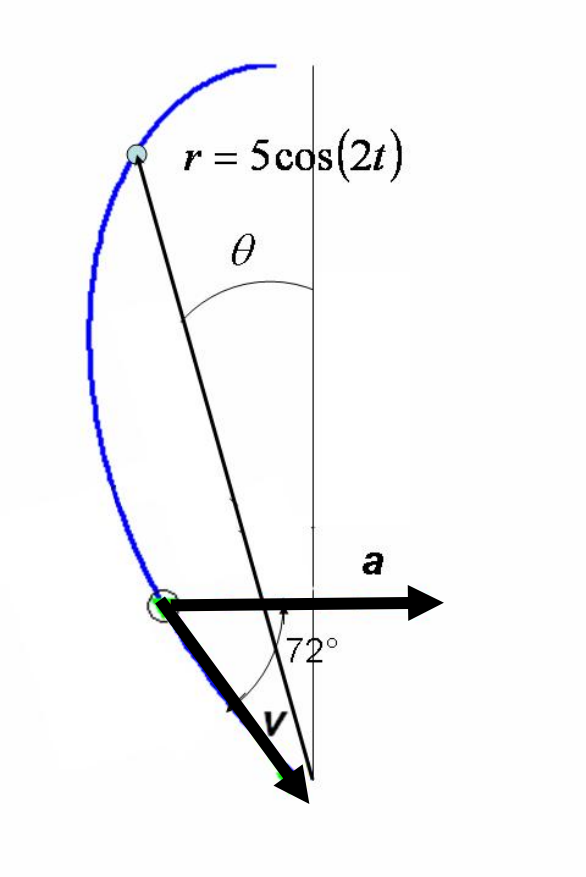
Airplane *B* is intercepting airplane *A* in the geometry shown. What absolute speed must airplane *B* fly such that the velocity of *B* with respect to *A* points directly at *A* as shown?



Name _____ 30 pts

ES204 Examination I **Problem 3** Dec. 15, 2006

A radio controlled model aircraft is pulling out of a loop (in the vertical plane) which has the shape $r = 5\cos(2t)$ meters, with θ in radians, defined ccw from the vertical. If $\theta = t$, then at t = 0.56 seconds, the acceleration vector is approximately horizontal, and the velocity vector is depressed 72 degrees from horizontal.



At time t = 0.56, determine

a) the magnitude of acceleration
b) the radius of curvature, assuming that $|\boldsymbol{v}|$ = 9.26 m/s at this instant.

Name _____ 40 pts

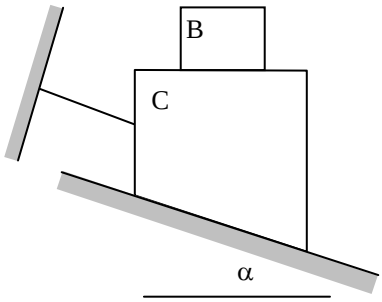
ES204 Examination I **Problem 4** Dec. 15, 2006

The mass of B, m_B, the mass of C, m_c, and the angle, α are all known.

a) If the cable connecting C to the wall is cut determine the equations necessary to find the accelerations of B and C.

b) Instead of cutting the cable, assume B is dropped from a known height h onto C. If the cable connecting C to the wall can stretch and has a spring constant, k, determine the equations necessary to find the velocities of B and C after the impact. Assume the coefficient of restitution between B and C is e.

DO NOT SOLVE THE RESULTING EQUATIONS! Your solution should consist of a table of unknowns and equations and a number collection of equations. Be sure to clearly document your solution.



Assume all surfaces are frictionless

Unknowns