Name _____ Section _____

ES204
Examination I
December 19, 1997

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

Show all work for credit
AND
Turn in your signed help sheet
And
Remain in your seat for the entire exam

Name _____ 30 pts

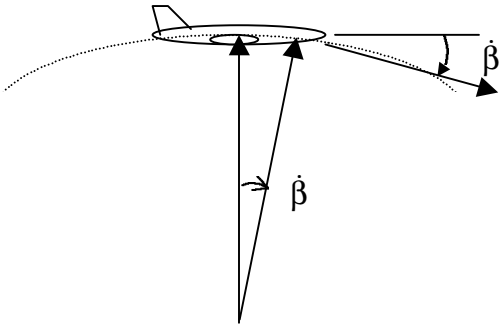
ES204 Examination I **Problem 1** Dec. 19, 1997

To simulate "weightlessness" in its cabin, a jet transport traveling at 800 km/hr (222.2 m/s) moves on a sustained vertical curve as shown. This means that the plane remains approximately parallel to the ground but its center follows the curve shown. This maneuver takes place at a mean altitude of 8 km where the gravity may be taken as 9.79 m/s^2. Determine:

a) the radius of curvature, ρ

b) the rate $\dot{\beta}$ in degrees per second at which the pilot should drop his longitudinal line of sight to cause the desired condition.

Hint: As your system, choose the pilot.



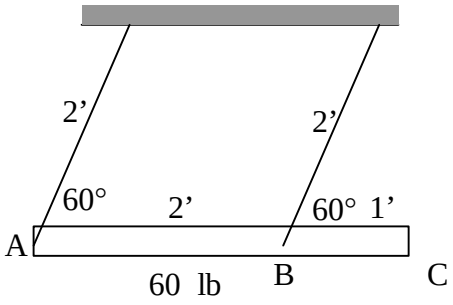
Name _____ 30 pts

ES204 Examination I **Problem 2** Dec. 19, 1997

The uniform 60 lb log is supported by two cables and used as a battering ram. If the log is released from rest in the position shown, determine

a) the tension in each cable immediately after release
b) the corresponding angular acceleration of the cables.

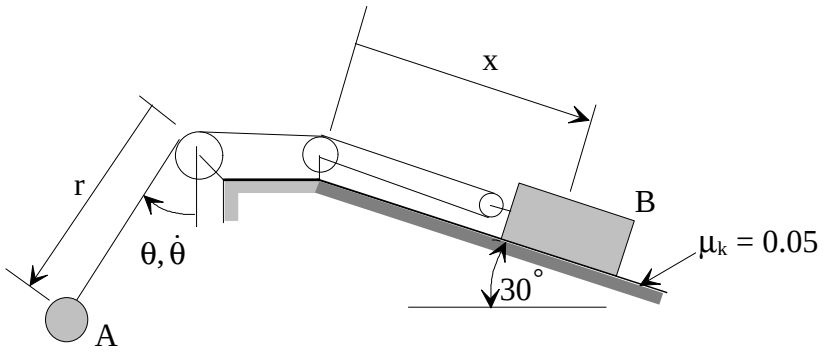
Note: Save all your calculations until after you have attempted all the problems on the test (i.e. give me a list of equations and unknowns and only solve if you have time).



Name _____ 40 pts

ES204 Examination I **Problem 3** Dec. 19, 1997

For the system shown below the mass of A is m_A and the mass of B is m_B. <u>At this instant</u>, the velocity of B (that is v_B), r, θ, and $\dot{\theta}$ are all known (Note: $\dot{\theta}$ and v_B are not constants). Assume $\dot{\theta}$ is in the direction shown and the block will slide to the right. Derive the equations necessary to solve for the tension in the cable, but **DO NOT SOLVE THESE EQUATIONS**. Your final answer should be a list of unknowns and a list of equation numbers that could be used to solve for the unknowns.



<u>Knowns</u>: m_A, m_B, r, $\theta, \dot{\theta}$, v_B

Answer:

Unknowns	Equation Number