

Physics 21 Problem Set 3

Harry Nelson

Due Monday, Jan. 24 in class
MIDTERM FRIDAY Jan. 28

Please make your work neat, clear, and easy to follow. It is hard to grade sloppy work accurately. Generally, make a clear diagram, and label quantities. Derive symbolic answers, and then plug in numbers after a symbolic answer is available.

1. K&K 2.14. Relating the accelerations of A and B to C, and the tensions on the ropes to one another are the heart of this problem. Then solve the system of equations, possibly with Mathematica.
 2. K&K 2.16. Here, take the angle of the wedge with respect to the horizontal as θ (that is the angle in the lower corner of the wedge), and derive your answer in terms of θ , m , and the acceleration of gravity, g . The heart of this problem is to consider the normal force of the wedge on the block (in addition to the weight of the block) and then to use the constraint discussed in Example 2.4(a).
 3. A mass moves with constant speed of $v = 1$ meter/second in a circular orbit with radius $R = 0.75$ meters. Determine, both symbolically and numerically,
 - (a) The angular velocity, $\omega = \dot{\theta} = d\theta/dt$.
 - (b) The radial component of the acceleration a_r .
 - (c) The ratio of the centripetal to the acceleration of gravity on earth, a_r/g .
 4. K&K 1.19
 5. K&K 1.20
 6. K&K 2.9
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