Name: _____ NetID: _____

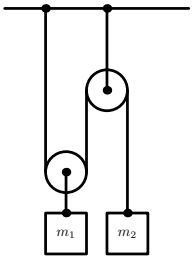
NYU Physics I—Term Exam 2

Problem 1: (From Lecture on 2016-09-27.) Starting at rest, a package of mass m slides down a ramp and off a jump angled at 45 deg to the horizontal. If it has dropped a vertical distance of H by the time it launches, and if it launches at 45 deg, and if there are no losses to friction or air resistance, what is the *horizontal component* of the velocity at launch? Give an answer in terms of m, g, and H.

Problem 2: (From Lecture on 2016-10-04.) In a one-dimensional problem, a 4 kg block moves to the right at $1.5\,\mathrm{m\,s^{-1}}$, and another 4 kg block moves to the left at $2\,\mathrm{m\,s^{-1}}$. Define the positive direction to be "to the right". What is the total momentum, and what is the total kinetic energy?

Problem 3: (From Problem Set 3, problem 1.) A runner on a straight road starts at rest, accelerates at $5\,\mathrm{m\,s^{-2}}$ for 2 s and then runs at constant speed for 10 s. What is the total distance that the runner has run in the full 12 s interval?

Problem 4: (From Problem Set 4, problem 2.) In the diagram shown at right, assume that strings are inextensible, and the positive direction is upwards. Assume that the blocks have nearly equal masses. What is the relationship, if any, between the acceleration of block m_1 and the acceleration of block m_2? No need to solve the whole problem!



Problem 5: (From blocks-and-pulleys worksheet.) How does it help us to assume that strings and pulleys are massless? Give one good, specific equation or reason.

Problem 6: (From friction worksheet.) You have a block of mass m on an inclined plane, inclined at an angle $\theta = 20\,\text{deg}$ to the horizontal. The coefficient of friction is $\mu = 0.9$. What is the magnitude of the frictional force on the block? The acceleration due to gravity is g.