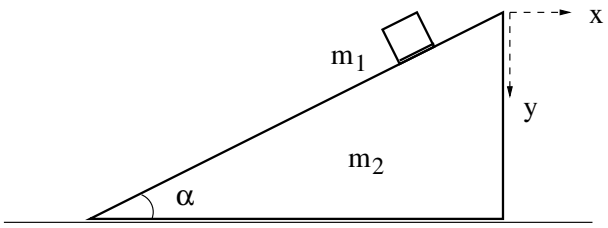
[mex33] Normal force of constraint

A particle of mass m_1 slides without friction on a wedge of angle α and mass m_2. The wedge in turn is free to slide without friction on a smooth horizontal surface. (a) Determine the Lagrangian $L(x_1, y_1, x_2, \dot{x}_1, \dot{y}_1, \dot{x}_2)$ and the holonomic constraint $f(x_1, y_1, x_2) = 0$ that goes with it. (b) Derive the associated four equations of motion for the three dynamical variables x_1, y_1, x_2 and the Lagrange multiplier λ. (c) Find the solutions and the forces of constraint acting on the particle and on the wedge. (d) Discuss the solutions in the limits $m_2 \to 0$ and $m_2 \to \infty$.



Solution: