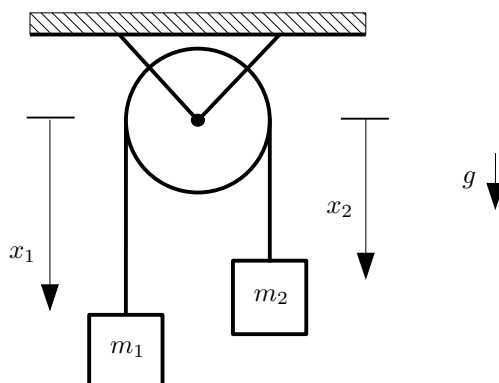


1 Atwood's Machine using a Lagrange Multiplier

An Atwood's machine machine is constructed with a fixed massless frictionless pulley, a stretch-less massless string, and two weights with masses m_1 and m_2 , as shown in the figure below. Use x_1 and x_2 as the positions of hanging weights as shown.



Find the acceleration of weight 1 (the weight with mass m_1) \ddot{x}_1 , the acceleration of weight 2 (the weight with mass m_2) \ddot{x}_2 , and T the tension in the string, by using Lagrange's equations and a Lagrange multiplier λ .