MIE100 Midterm Test #2 – March 14, 2019

This test has **THREE** pages - Allotted time: **90 minutes**.

1. The mass of block "A" is m_A = 60 kg, and the mass of block "B" is m_B = 20 kg. A rope is shown as a dashed line in the diagram. Neglect the mass and friction of the rope and pulleys. Friction coefficients between block "A" and the hill are μ_s = 0.25 and μ_k = 0.2.

10 (a) Suppose that the system is released from rest. Will block "B" move upwards, or downwards, or remain stationary? Prove it.

10 (b) Suppose that at the instant shown in the diagram, block "B" has a velocity of $\vec{v}_B = 2.5\,\hat{j}$ m/s. What will be the velocity and acceleration of block "A" at this instant, and the tension in the rope?

5 (c) Suppose that at the instant shown in the diagram, block A is sliding down the hill at a speed of 2.3 m/s. Let E represent the total sum of the kinetic and gravitational potential energies of blocks "A" and "B", such that: $E = T_A + T_B + (V_G)_A + (V_G)_B$.