**Physics 12**
Assignment # 7
Forces and Atwood Machines
Due Friday, May 24th, 2019

Problems - Show all your FBDs

1. A rescue volunteer has to lower himself over a cliff to do a rescue. He takes a rope and ties it around a large 800kg rock. He then lowers himself safely. If his mass is 100kg, determine the minimum coefficient of friction between the rock and ground to keep him from falling.

2. A modified Atwood machine is designed like the one below. a) Determine the acceleration of the masses if mass 1 is 5kg, mass 2 is 40kg and mass 3 is 10kg. The coefficient of friction is 0.100. b) Which cable has a greater tension? Explain.
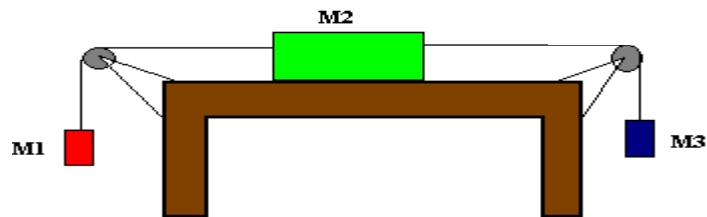
3. You have been challenged to move a solid **aluminum** box across a **mild steel** platform. You have the choice of pulling the box with a rope upward at an angle of 20^0 or pushing downward with an angle of 20^0. Determine the required force to get it started with each angle. The dimensions of the box are 80cm in length, 20cm in width and 30cm high. Yes, that's all the info you are being given.

Practice:

1. You are preparing to enter a dog sled race in Nunavut. Your sled, loaded with you and supplies, has a mass of 200kg. After doing research you find that the dogs need 10 meters to reach their constant velocity of 5m/s. Two ropes are attached to the sled, one on each side of the dogs. The ropes pull upward at an angle of 10^0. a) What are the tensions in the ropes at the start of the race? b) What are tensions in the ropes after they reach constant velocity? Assume the tension in the ropes is equal. The coefficient of static friction is 0.12 and the coefficient of kinetic friction is 0.06. (Note: Tension is just the force applied by the ropes)