ENGR/PHYS 216 – Spring 2023
HW Assignment 6: UAE

Note: For all problems, define, draw, and label your system.

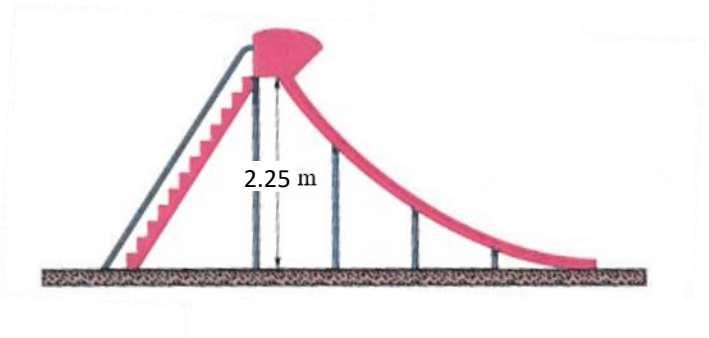
1. Five friends (Amari, Blake, Emerson, Jamie, and Kai) have a weekly meetup for dinner. During the first week Blake pays $25 and Jamie pays $50. to cover the group's expenses. During the second week Amari pays $50., Emerson pays $25, and Kai pays $25. During the third week Amari pays $15, Blake pays $30., Jamie pays $35, and Kai pays $30. During the fourth week Emerson and Kai both pay $35. The five friends then decide to split all of the dinners equally and calculate who owes who how much money.
   a. Who ends up owing money and how much does each person owe?
   b. Write out the fewest transactions needed to 'settle up' (make it so everyone paid the same amount). *Example: Kai pays Amari $20*

2. A water park has a giant bucket that dumps water over the top of a playground (see the images below). The bucket is approximately the size of a 55-gallon drum with height 85.0 cm and diameter 57.0 cm. Water flows into the bucket at a rate of 1.34 L/s. When the water level reaches a height of 78.9 cm, the bucket dumps its contents.
   a. How long does it take for the bucket to fill up and dump water over the playground?
   b. A mischievous kid drills holes in the bottom of the bucket so that it loses water at a rate of 0.162 L/s. How much **longer** does it now take for the bucket to fill up and dump water over the playground?


(Singapore Bird Park, 3 January 2023, taken by Dr. Ritchey)
Here's another example from the Singapore Zoo (this one got me)

3. A playground slide is in the form of an arc of a circle with a maximum height of 2.25 m, with a radius of 8.75 m, and with the ground tangent to the circle. Dr. Ritchey's 18.6 kg toddler starts from rest at the top of the slide and has a speed of 3.52 m/s at the bottom.

a. What is the length of the slide?
b. What average frictional force acts on the toddler over this distance?



4. A chocolatier visits Singapore and discovers the incredible taste of durian. They decide to create a durian flavored chocolate bar that costs no more than $4.50 per pound to produce. If plain chocolate costs $3.50 per pound and durian costs $15.75 per pound, how many pounds of durian are needed to produce 216 pounds of durian flavored chocolate bars?