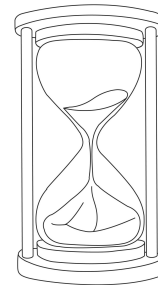


## Problem set 7 (Assigned on October 31st)

**1.** There are 10 bags with many coins. One of them contains only counterfeit coins, each of which is 1 gram lighter than a genuine coin. Using only one weighing on a balance with an arrow showing the difference between weights on the pans, find the bag that contains the counterfeit coins.

**2.** (a) If you have a 7-minute hourglass and 11-minute hourglass, can you use them to boil an egg for 15 minutes? (b) Is it possible to start the egg boiling at the same time you start an hourglass and still boil the egg for 15 minutes?

Note that hourglass is a device that can measure precisely the given time interval, but not any shorter one.



**3.** Is it possible to tie a goat with help of ropes and sticks so that it eats the grass in the shape of the regular hexagon?

**4.** Old McDonald has a pasture with the circular fence with the radius 10 meters around it. He also has several 10 meter long ropes and goats. What is the minimal number of goats he needs to tie to the fence so that the goats eat all the grass.