

**CSE 1010 Ideas and Impact of Computing**  
**Homework 2**  
**Due 11am, Fri, Oct 3, 2014**  
**Submit Server: Class = cse1010 ; Assignment = hw2**

Template Java file: `cs.fit.edu/~pkc/classes/cse1010/HW2.java`

**\*\*\* You may not use repetition/looping (which is slower) to solve the following problems \*\*\***

1. President Obama just announced an additional \$500 million to help fight Ebola in West Africa. Using a simplistic model, we can roughly estimate the number of infected people after a certain number of days (if inadequate intervention is in place). Consider on Day 0, 1 person was infected. On Day 1, that person infected two additional persons. On Day 2, each of the two infected two additional persons. We would like to estimate the total number of people who have been infected after  $N$  days:

$$infectedTotal = 1 + 2 + 4 + \dots + 2^N = 2^0 + 2^1 + 2^2 + \dots + 2^N$$

This is a geometric series, which has a closed-form solution. If you don't know the closed-form solution, look it up. Two problems to solve:

- (a) Given *days* ( $N$  above) as input, output *infectedTotal*
  - (b) Given *infectedTotal* as input, output *days* (with decimal places is fine)
2. High definition TV sets (HDTVs) are becoming very popular. Since the aspect ratio (width:height) of 16:9 ("widescreen") for HDTVs is different from 4:3 for regular TVs, selecting a size (traditionally measured by the diagonal length) becomes problematic. Both TV designers and consumers could benefit from the size conversion.

Given the size (diagonal length) in inches of a regular TV as input, output the size (diagonal length) of a HDTV with a screen of the:

- (a) same height,
  - (b) same width, and
  - (c) same area.
3. A new company selling mechanical parts for airplanes is trying to estimate its revenue. The company assumes 100 items will be sold in the first month, 200 in the second month, 300 in the third month, ... as the new company grows.

Note that this is related to an arithmetic series, the closed-form solution helps solve this problem.

- (a) Given the average price of an item and number of months as input, output the total revenue.
- (b) Given the desired total revenue and average price of an item as input, output the number of months to achieve the desired total revenue.
- (c) Given the desired total revenue and number of months as input, output the average price of an item.