Answer 2 out of the following 3 questions, for **20 points** each

**Question ONE (20 points): Smart nephew’s challenge**

Your little (but smart!) nephew is learning about arithmetic operations. He has observed that for each positive integer up to 10, if you repeat the following steps, you always reach 1:

- if a number is even, then divide it by two
- if it is odd, add its double to its successor

1) 10 points: He would like to know if this is also true for all numbers up to 100 and asks for your help. *Write some code in a programming language of your choice that answers his question.*

2) 10 points: Excited by your answer, he would like to know if the same happens for numbers between one million and and two millions. You are in a rush, and as this can take too much time, you offer to *write a random tester* that would try that out for some of those numbers.

*He would be happy if for all 100 tests that your random tester picks, the same thing happens as it did for numbers up to 100.*

**Question TWO (20 points): Popular palindrome**

At the *github site of your team*, create a new branch and show 3 push operations while developing, in a language of your choice, a small program that detects if a word is a palindrome (i.e., if it reads the same way from left to right or right to left) and, at the same time, using the list of the following 1000 *most common English words*, if it is found among them.

Submit as your answer, *the link to it as well as the git commands you have used.*

**Question THREE (20 points): Which pages make my customers leave?**

You work for an online grocery’s website. It is a sad fact that quite a few customers leave after seeing the pictures of produce (with their prices) that the site sells. You are given a log-file containing all the steps (clicks from a page to another) that 10000 customers took.

You are part of a small agile team that *needs to detect the reasons for it, in no more than 2 one week sprints.*
Describe the steps of a scrum process that will get your team, iteratively, to a working software artifact that can be integrated in the web infrastructure of your company, solving this problem. Here is an example of such steps.

Your narrative should focus on roles, stories, phases of the process, backlog examples, a sprint example etc. and be detailed enough to help someone reading it believe that you actually did it.

Hint: There's a chance that some of the pictures of produce at the site, taken on a Tuesday morning, might have looked like this picture and some others like this picture.