# ZCE 111
Assignment 1

Q1. Paying off an installment

Write a code to determine what is the installment you need to pay every week if you wish to pay off a loan amount of 5000 in the 52-th week, assuming the interest rate 2% per week.

Q2. Zeno paradox

Achilles, the fleet-footed hero of the Trojan War, is engaged in a race with a lowly tortoise, which has been granted a head start. Achilles' task initially seems easy, but he has a problem. Before he can overtake the tortoise, he must first catch up with it. While Achilles is covering the gap between himself and the tortoise that existed at the start of the race, however, the tortoise creates a new gap. The new gap is smaller than the first, but it is still a finite distance that Achilles must cover to catch up with the animal. Achilles then races across the new gap. To Achilles' frustration, while he was scampering across the second gap, the tortoise was establishing a third. The upshot is that Achilles can never overtake the tortoise. No matter how quickly Achilles closes each gap, the slow-but-steady tortoise will always open new, smaller ones and remain just ahead of the Greek hero. [Adapted from: http://www.slate.com/articles/health_and_science/science/2014/03/zeno_s_paradox_how_to_explain_the_solution_to_achilles_and_the_tortoise.html]

Q2. Zeno paradox (cont.)

$d=d_0$

T

A

$n=0, t=t_0$

A   T

$d=d_1$

$n=1, t=t_1$

A   T $d=d_2$

$n=2, t=t_2$

A   T

$d=d_3$

$n=3, t=t_3$
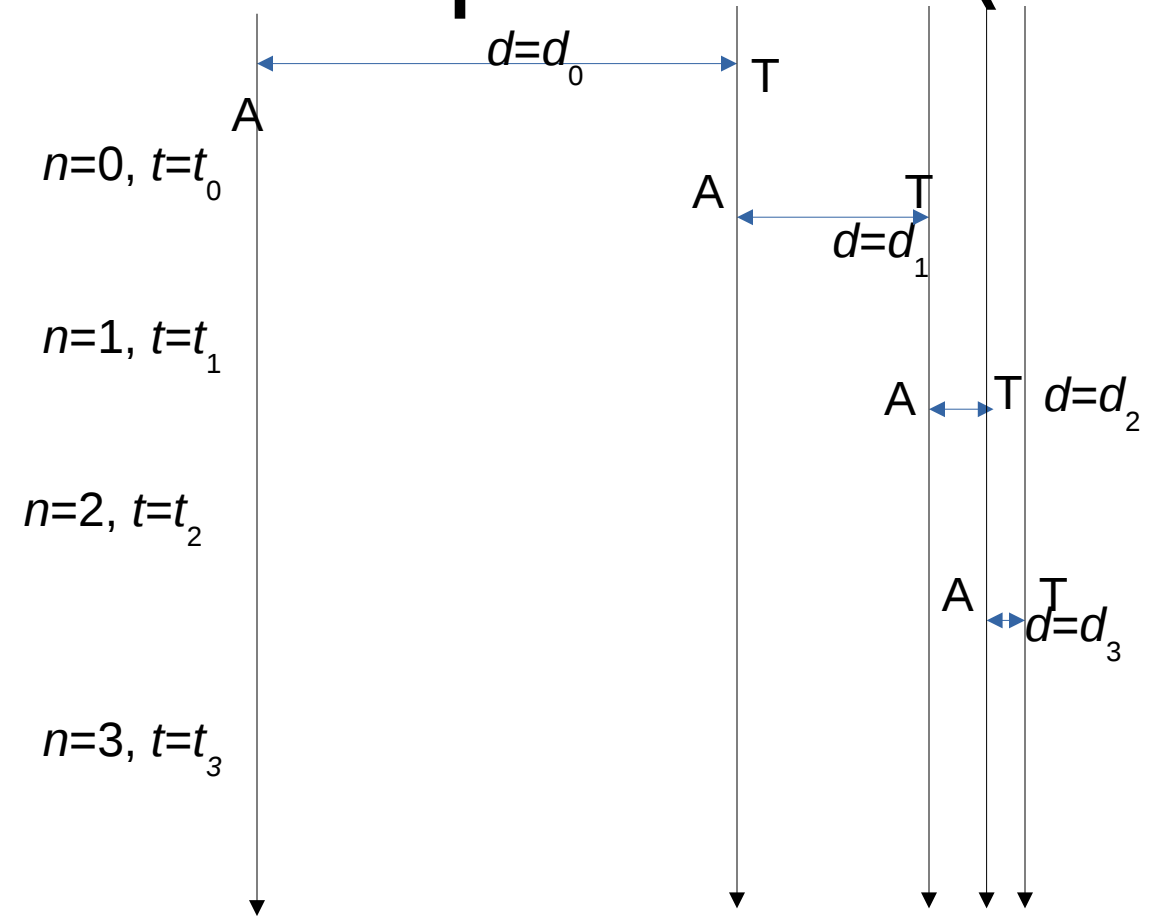
Q2. Zeno paradox (cont.)

Given the initial values (in S.I units) of (1) the initial gap, d_0=1 km, (2) the speed of the tortoise, v_T =1 mm/s (3) the speed of Achilles, v_A=10 m/s, write a Do-loop to printout the following information:

$$n, t_n, d_n$$

for n=0, 1, 2, ..., N, where N an integer such that d_N a number that is practically so small that it can be considered to be zero.

You should check that your code reproduce the theoretical value given by $T=d_0/(v_A-v_T)$, where T is the time when Achilles overtakes the tortise.

Q3. Plot the graph of Zeno paradox

Based on Q2, plot and fully customise the graph of

(i) distance between A and T as a function of time
(ii) distance between A and T as a function of n
(iii) time elapsed as a function of n