Name:_____

Read carefully the problem, then identify the important parts, make a **model**, and a **flow chart**. Remember to describe all the passages that brings you to give a certain answer (why a certain value is an input, where you found information on the data type, why you made a certain choice, etc. . .).

Work: You have been contacted by the *WHO*, they need to build a software for calculating whether they are able to develop an effective vaccine for a flu type in a certain period of time or not.

A simple mathematical model for the spreading of an infection in a population is given by the equation:

$$p(t) = \frac{100}{1 + \frac{100 - p_0}{p_0} e^{-\lambda t}} \tag{1}$$

where $p(t)$ is the percentage of the population infected at a time t, expressed in days from now. p_0 is the percentage of the infected population at time $t = 0$ (now), and λ is the virulence rate of the virus in a certain population. The value of λ can be between 0 and 1.

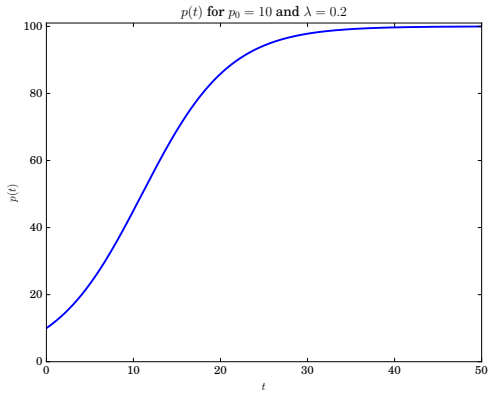

Figure 1: Example of equation (1)

When the *WHO* discover a new ongoing flu infection they follow the steps:

1. study the pathogen;
2. study the population;
3. use the results of the previous studies to calculate a specific λ rate for the infection;
4. calculate the percentage of the population infected at current time;
5. calculate the time to develop enough doses of vaccine for half the population, in days.

At this point they need to use your program to determine if they can develop the vaccine in time for half of the population, or if the infection is faster than the time needed (more than half of the population will be already infected when the vaccine will be ready).

Tip: You can use the equation (1) to calculate if in a certain time the infected population is less or more than the 50%. The output can be a *"Yes"* if the *WHO* can develop the vaccines in time or a *"No"* otherwise.