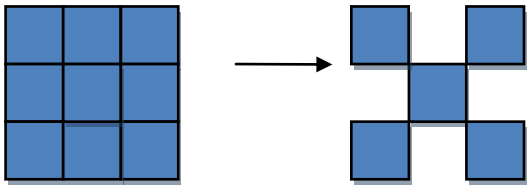
15 a)

What is the dimension of the fractal?

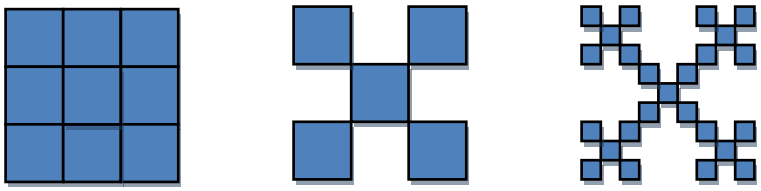
Consider the fractal which has approximations defined as follows:

The first stage of the approximation is a line of square with sides of length 1

The n+1st stage is obtained from the nth stage by replacing every square by



Where every square has side with a length 1/3. The first 3 approximations to the fractal are:



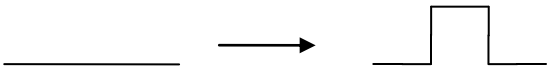
What is the dimension of the fractal?

15 b)

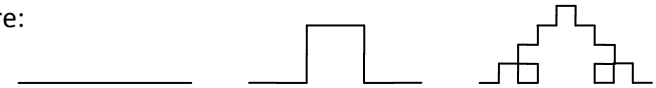
Consider the fractal which has approximations defined as follows:

The first stage of the approximation is a line of length 1

The n+1st stage is obtained from the nth stage by replacing every line segment by the following:



Where every line segment on the right hand side has length 1/3. The first 3 approximations to the fractal are:



What is the dimension of the fractal?

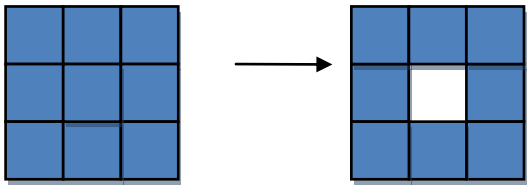
15c)

What is the dimension of the fractal?

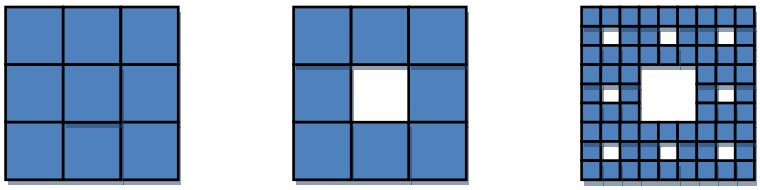
Consider the fractal which has approximations defined as follows:

The first stage of the approximation is square with sides of length 1

The n+1st stage is obtained from the nth stage by replacing every square by

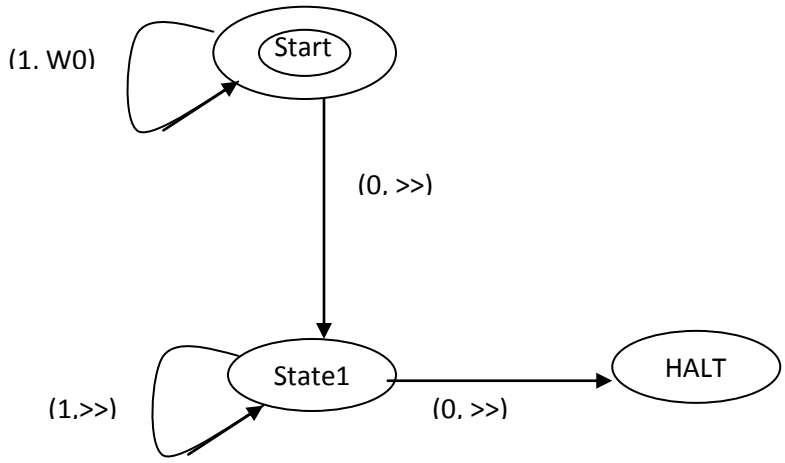


Where every square has side with a length 1/3. The first 3 approximations to the fractal are:

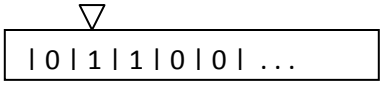


What is the dimension of the fractal?

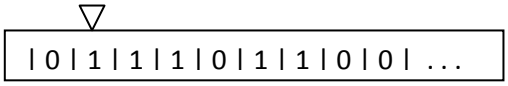
16 a, b) Consider the Turing machine with the following state diagram.



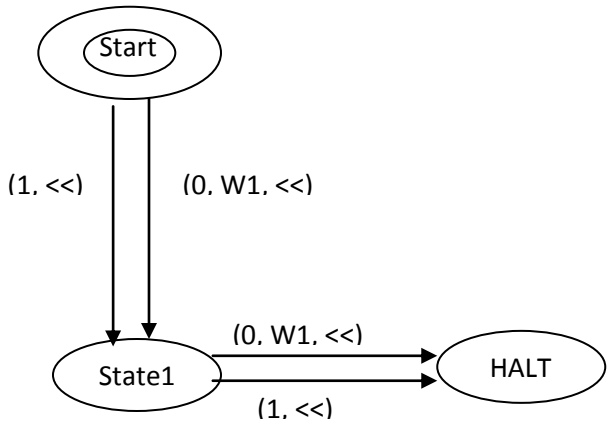
Does the above Turing machine halt on the following input and if so what is the final state of the tape and head?



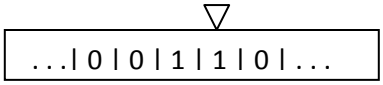
Does the above Turing machine halt on the following input and if so what is the final state of the tape and head?



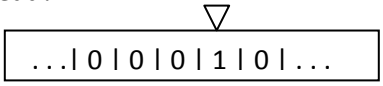
16 c, d) Consider the Turing machine with the following state diagram.



Does the above Turing machine halt on the following input and if so what is the final state of the tape and head?



Does the above Turing machine halt on the following input and if so what is the final state of the tape and head?



17 a) Consider the discrete dynamical system given by

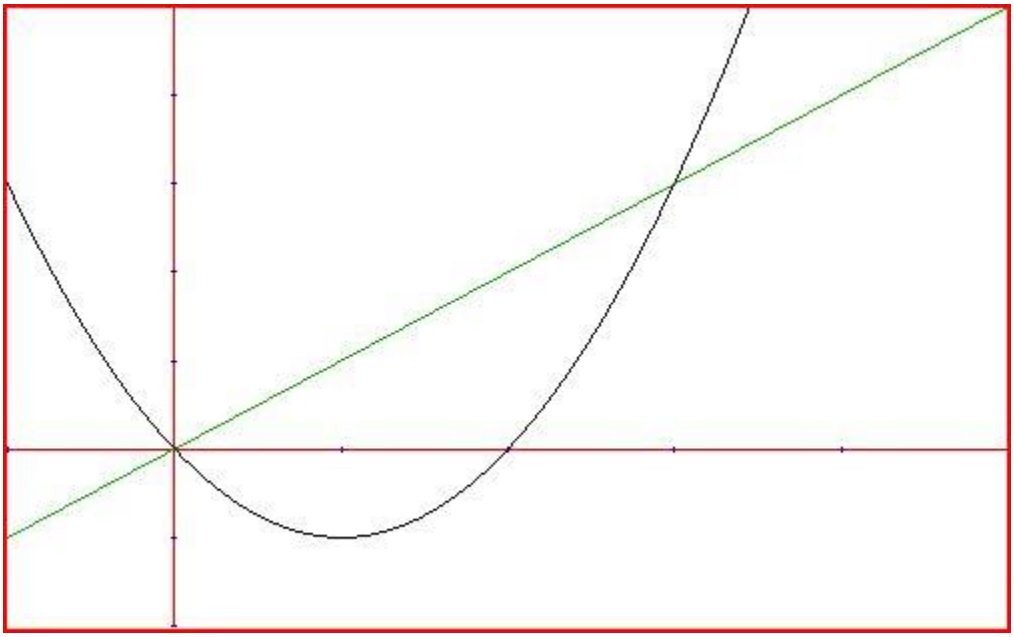
$$P_{n+1} = P_n^2 - 2P_n$$

What are the equilibrium and are they stable or unstable from the left and right?

The following is the graph of

$y = x$

$y = x^2 - 2x$



17 b) Consider the discrete dynamical system given by

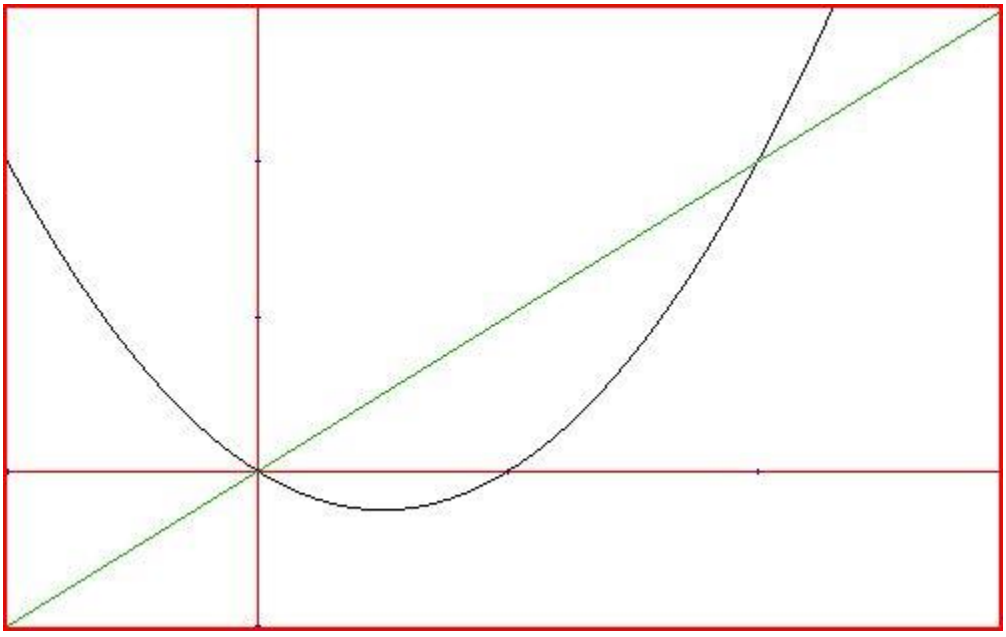
$$P_{n+1} = P_n^2 - P_n$$

What are the equilibrium and are they stable or unstable from the left and right?

The following is the graph of

$y = x$

$y = x^2 - x$



17 c) Consider the discrete dynamical system given by

$$P_{n+1} = P_n^2$$

What are the equilibrium and are they stable or unstable from the left and right?

The following is the graph of

$y = x$

$y = x^2$