

## (Math 170) Homework 6:

Due November 8, 2007

All exercises are from “The Heart of Mathematics” text book.

Exercise 1: Consider the mathematical model  $R_{n+1} = 1.5R_n$ . Draw a spider diagram for  $R_n$  starting at  $R_0 = 1$ . What happens as  $n$  goes to infinity? Does this system have any equilibrium? If so are they stable or unstable?

Do the same thing for  $R'_{n+1} = 1 + 0.5R'_n$ .

Exercise 2: Suppose you have a system  $\bar{R}_{n+1} = a + b\bar{R}_n$  for some real numbers  $a, b$  with  $b > 0$ . What can you deduce about the long term behavior of  $\bar{R}_n$  from the values of  $a, b$ ? Are there any equilibriums for  $\bar{R}_n$ ? If so what are they (note they will depend on  $a, b$ )? For what values of  $a, b$  are the equilibrium (if they exist) stable? What values are they unstable? (remember to consider both positive and negative values for  $\bar{R}_0$ )

Exercise 3: Consider the mathematical model  $S_{n+1} = 1 - S_n$ . Draw a spider diagram for  $S_n$  starting at  $S_0 = 1$ . What is the long term behavior of this system? Does this system have any equilibrium? What happens if you change the starting value?

Exercise 4: Chapter 6.2 Exercise 36

Exercise 5: Chapter 6.2 Exercise 38

Exercise 6: Chapter 6.2 Exercise 40

Exercise 7: Chapter 6.3 Exercise 3

Exercise 8: Chapter 6.3 Exercise 4

Exercise 9: Chapter 6.3 Exercise 14