

## Math 388 Exercises

**Instructions:** work these problems in addition to #4-5, 10 on page 36 of the book.

1. Sketch a cobweb diagram for  $f(x) = x^2$  showing that 0 is a sink.
2. Sketch a cobweb diagram for  $f(x) = x^2 - 1$  showing that the 2-cycle  $\{0, -1\}$  is a sink.
3. Find the fixed points of  $x^2 - c$  (in terms of  $c$ ). Identify the number  $c_0$  such that there are no real fixed points if  $c < c_0$ .
4. Show that the larger fixed point in #3 is not a sink. Find the number  $c_1$  such that the smaller fixed point is a sink if  $c_0 < c < c_1$ .
5. Show that for  $c < c_1$  (found in #4) there is not a 2-cycle. Find the number  $c_2$  such that the 2-cycle is a sink if  $c_1 < c < c_2$ . [Hint: after setting up the 4th-order equation for the 2-cycle, use the calculator to divide out the factor of  $x^2 - x - c$  from the fixed point equation.]