(Math 170) Homework 3:

Due January 24, 2007

Exercise 1: Go to

http://math.bu.edu/DYSYS/applets/JuliaIteration.html

And find 5 regions of the Mandelbrot set which look different, with at least one of them looking approximately like the entire Mandelbrot set (i.e. what you first see when you load the page).

For each region also select a point and have the applet calculate the Julia set (in the lower right corner). Then print out the results (with both the Julia sets as well as the region of the Mandelbrot set)

Exercise 2: Recall from class that if $P_n = (P_{n-1})^2$ then $P_n = (P_0)^{2^n}$. Write out P_0, P_1, P_2, P_3, P_4 when $P_0 = 2$. Do the same thing when $P_n = i$.

Let $Q_n = (Q_{n-1})^3$. Write out Q_0, Q_1, Q_2, Q_3 when $Q_0 = 2$. Express Q_1, Q_2, Q_3 in terns of Q_0. Find a general formula for Q_n in terms of Q_0 (you do not need to prove it is the general formula).

Exercise 3: If $log_2(x) = 4$ what is x?

If $log_4(x + 2) = 2$ what is x?

Exercise 4: What are the complex conjugates of the following numbers? What are their norms?

- 4
- 4 + 3i
- $12 - 5i$