1) With \( f_c(z) = z^2 + c \), which of the following statements are true?

a) The Mandelbrot set is the set of complex numbers such that \( f_c^n(c) \to \infty \).

b) The Mandelbrot set is the set of complex numbers such that \( f_c^n(c) \leq 2 \) for all \( n \). (You have shown in the homework that if \( f_c^n(c) > 2 \) then \( c \) is not in the Mandelbrot set).

c) The Mandelbrot set is the set of complex numbers such that \( f_c^n(c) \) stays bounded.

2) True or False?

a) Every quadratic polynomial is conjugated to the polynomial \( f_c(z) = z^2 + c \).

b) Every cubic polynomial is conjugated to a polynomial \( g_c(z) = z^3 + c \).

c) Every cubic polynomial is conjugated to a polynomial \( g_{a,b}(z) = z^3 - 3a^2z + b \).

3) True or False?

a) The union of the Julia set and the Fatou set is the entire complex plane.

b) The Fatou set is the complement of the Mandelbrot set.

4) Who was historically first to have made pictures of the Mandelbrot set?

a) John Hubbard.

b) Douady and Hubbard.

c) Benoit Mandelbrot.

d) Brooks and Matelski.

5) A fixed point of a quadratic map \( f(z) \) is defined to be stable, if (only one answer applies):

a) \( f'(z) < 1 \).

b) \( |f'(z)| \leq 1 \).

c) \( |f'(z)| = 0 \).

d) \( |f'(z)| < 1 \).

6) True or False?

a) The Ulam map \( f(z) = 4z(1 - z) \) is in the complex plane conjugated to \( f_{-2}(z) = z^2 - 2 \).

b) The Julia set of the polynomial \( f_0(z) = z^2 \) is the circle with radius 1.

c) The filled in Julia set of the polynomial \( f(z) = 4z^2 \) is the disc of radius 1/2.

7) True or False? The Ulam map \( f(z) = 4z(1 - z) \) restricted to its Julia set is conjugated to \( x \mapsto 2x \mod 1 \).

8) Which of the following dynamical systems is called the Newton iteration to find the root \( f(z) = 0 \):

a) \( T(z) = 1 - f(z)/f'(z) \)

b) \( T(z) = z - f'(z)/f(z) \)

c) \( T(z) = 1 - f'(z)/f(z) \)

d) \( T(z) = z - f(z)/f'(z) \)

9) In order to find a fixed point of a map \( S \), we can try to apply the Newton method to one of the following:

a) \( T(z) = S(z) - z \)

b) \( T(z) = S'(z) - z \)

c) \( T(z) = z - S(z)/S'(z) \).

10) True or False? The Mandelbrot set is a fractal because its dimension has shown to be smaller than 2 and bigger than 1.