Lecture 12: Quiz

Name:

Problem 1

1) Look at the map $T(x) = 2x^2 - 1$ on the real line. Which of the following form an **orbit** of T?

a) $1, 1, 1, 1, 1, ...$
b) $0, -1, 1, 1, ...$
c) $0, 0, 0, 0, 0, ...$
d) $0, 1, 2, 3, 4, ...$

Problem 2

2) What is the Ulam-Collatz system?

a) A differential equation showing chaotic behavior. b) Produce the pedal triangle from a given triangle
c) Take the sum of the denominators from a number.
d) Divide by 2 if even and triple plus 1 if odd.

Problem 3

Which of the following dynamical systems is the **Lorentz system**
a) $\ddot{x} + x + (x^2 - 1)y = 0$.
b) $\dot{x} = 10(y - x), \dot{y} = -xz + 28x - y, \dot{z} = xy - \frac{8z}{3}$
c) $x'(t) = x(t)$.
d) $x''(t) = -x(t)$.

Problem 4

Which of the following dynamical systems have a discrete time? We replace "map" or "differential equation" with "system".

a) Henon system
b) Three body system
c) The double pendulum
d) Collatz system.

Problem 5

Which dynamical system is used to find the roots of a function:

a) The Feigenbaum map
b) The Ulam map
c) The Newton method
d) The Kepler system

Problem 6

Which mathematician was the first to establish that low dimensional systems can exhibit chaotic bahavior?

a) Kepler
b) Newton
c) Poincaré
c) Mandelbrot

Problem 7

Which mathematician pair pointed out the concept of a strange attractor?

a) Hardy-Littlewood
b) Ruelle-Takens
c) Poincare-Bendixon
d) Douady-Hubbard

Problem 8

Which movie features the "butterfly effect"?

a) Jurassic park (1993)
b) Butterfly dreaming (2008)
c) Silence of the lambs (2001)
d) Amelie (2001)