Lecture 7: Quiz

Name:

Problem 1

Which two set operations are the addition and multiplication in a Boolean ring?
a) intersection and union
b) intersection and symmetric difference
c) intersection and complement
d) union and complement

Problem 2

In the Boolean ring, which set is the 0 element satisfying $0 + A = A$ for all sets A?
a) the full set X
b) the empty set $\emptyset$
c) the set $\{0\}$
d) there is no 0 element

Problem 3

Which properties hold in a Boolean ring with addition $+$ and multiplication $\cdot$? Remember that for sets the addition is the symmetric difference and the multiplication is the intersection.
a) $A \cdot A = \emptyset$
b) $A \cdot A = A$
c) $A + A = A$
d) $A + A = A \cdot A$
e) $A + A = \emptyset$
f) $A \cdot A = X$

Problem 4

Which of the following sets have the same cardinality as the natural numbers? Pick three.
a) The two dimensional plane
b) The integers $\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots$
c) The interval $[0, 1]$.
d) Three dimensional space.
e) The algebraic numbers.
f) The set of primes.

Problem 5

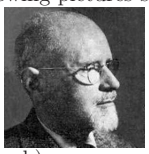
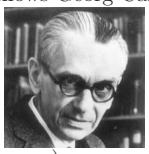
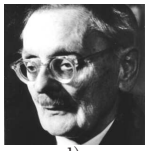
Which mathematician established first that there are different types of infinities?
a) Alan Turing
b) Georg Cantor
c) Alfred Tarski
d) Kurt Goedel

Problem 6

The Continuum Hypothesis is:
a) There is a cardinality between the cardinalities of the reals and integers.
b) There exists a cardinality different from the cardinality of the integers.
c) There exists an infinite set.
d) There exists a continuum of cardinalities.

Problem 7

One of the following pictures shows Georg Cantor? Which one?


a)

b)

c)

d)

Problem 8

One can generalize **set theory** by looking at functions on X. Which field of math does this give?
a) Probability theory.
b) Fuzzy set theory.
c) Topology
d) Differential geometry.
e) Fractal theory.
f) Chaos theory

Problem 9

Which paradox have been found by Russell:
a) The Berry paradox about the smallest integer which can be described in 10 sentences.
b) The liars paradox: I'm a liar.
c) The set of all sets which do not contain themselves as a set.
d) There is no way to make a surprise examination this year.
e) The barber's paradox: the barber shaves everybody who does not shave himself.
f) In a waiting line in the supermarket one is always in the slowest line.

Problem 10

What does Goedel's incompleteness theorem tell? Pick two:
a) The axiom system ZFC is incomplete.
b) Life is like a box of chocolates. One never knows what one is going to get.
c) We never know what is true since we can always change the axiom system.
d) In a strong enough system, there are true statements which can not be proven within the system.
e) The consistency of a strong enough axiom system can not be proven within a system.
f) The set which consists of all sets which do not contain themselves is not a set.