Subject 24.118. Paradox and Infinity. Homework Due Thursday, December 6.

1. Here are the truth tables for "$\wedge$" and "$\neg$," in the logic with truth-value gaps:

P	Q	(P $\wedge$ Q)
T	T	T
T	F	F
T	gap	gap
F	T	F
F	F	F
F	gap	F
gap	T	gap
gap	F	F
gap	gap	gap

P	$\neg$P
T	F
F	T
gap	gap

Give the truth tables for "$\vee$" and "$\rightarrow$," defined by "(P $\vee$ Q) $=_{Def}$ $\neg$($\neg$ P $\wedge$ $\neg$ Q)" and "(P $\rightarrow$ Q) $=_{Def}$ $\neg$(P $\wedge$ $\neg$Q)."

2; Consider the following exchange:
A says: "Some of the things B says are true."
B says: "Nothing A says is true."
"5 + 3 = 7"
C says: "Some of the things C says are true"
"Some of the things D says are true"
"Some of the things A says are true"
D says: "Some of the things C says are true"
"'"9 us a perfect square" is true' true"
Classify the sentences as true, false, or unsettled in Kripke's smallest fixed point.

3. For each of the following, either give an example or explain why there is no example:
a) A sentence true in some fixed points and unsettled in others, but never false.
b) A sentence false in some fixed points and unsettled in others, but never true.
c) A sentence true in some fixed point and false in others, but never unsettled.
d) A sentence true in every fixed point.
e) Two sentences that don't have a truth value at every fixed point, but have opposite truth values in every fixed point in which they do have truth values.

4. Use the fact that there are infinitely many Truthtellers to show that there are $2^{\aleph_0}$ fixed points.