Math 6a/b: Homework 3

Homework #3 is *due October 14*. Please, write clearly which problem you are solving and show *all steps* of your solution.

Some of the problems in this assignment are from the island of The Knights and Knaves. Remember, Knights always tell the truth, and Knaves always lie. You can find these problems and many more at: **http://philosophy.hku.hk/think/logic/knights.php**

1. On the island of Knights and Knaves you meet two inhabitants: Carl and Betty. Carl says, 'Neither Betty nor I are knaves.' Betty claims, 'Carl and I are the same.' Can you determine who is a knight and who is a knave?

2. On the island of Knights and Knaves you meet two inhabitants: Sue and Zippy. Sue says that Zippy is a knave. Zippy says, "Both Sue and I are knights." Can you determine who is a knight and who is a knave?

3. On the island of Knights and Knaves you meet two inhabitants: Bart and Ted. Bart claims, "Ted and I are both knights or both knaves." Ted tells you, "Bart would tell you that I am a knave." So who is a knight and who is a knave?

4. **(Optional)** Now imagine that the island also has Normals, who can either say truth or lie. Amy, Bob, and Celine are from the island of Knights, Knaves, and Normals. One of them is a Knight, one is a Knave, and one is Normal. Amy says that Celine is a Knave. Bob says that Amy is a Knight. Celine says that she is a Normal. Can you figure out who is who?

5. You are in a maze on the island of Knights and Knaves. There are two doors: you know that one leads to freedom and one leads to certain doom. There are two guards nearby, and you happen to know that one is a knight and one is a knave, but you don't know who is who. They allow you to ask only one of them a single question before you choose a door — what do you ask?

6. Find the greatest common divisor and least common multiple of 132 and 90.

7. Solve the following equation: $5-2(1-x) = 9$.

8. (Please, do not use calculator to solve the following question) The maximal distance from Sun to Pluto is 7,375,927,931 km. Speed of light is about 300,000 km/sec. How long does it take for Sun's light to reach Pluto? (You do not need to give a precise answer – an approximate one like "about 2 minutes" would be fine.)