Math 6c, homework 6.

1. Mother told Mary, that she could play videogames if she did her homework, also did her room, and did the dishes after diner. Will Mary play video games if she:
    a. cleaned her room?
    b. cleaned her room and washed the dishes?
    c. did her homework?
    d. did her homework and washed the dishes?
    e. completed all three tasks?

2. On another day, mother told Mary that she could play videogames if she did her homework or washed the dishes. Will Mary play the videogames if she
    a. did her homework?
    b. washed the dishes?
    c. did both tasks?
    d. did nothing?

3. Write a truth table for the statement:
    a. Every morning John eats an omelet and a bowl of oatmeal. (In this case the logical AND is used, which is True only when both statements are true).
    b. Every morning John eats an omelet or a bowl of oatmeal. (In this case the logical OR is used, which is True when one or both statements are true).
    c. Every morning John eats an omelet xor a bowl of oatmeal. (In this case the logical XOR (exclusive OR) is used, which is True when one of two statements is True, otherwise it's False).
    d. Every morning John eats (an omelet or a bowl of oatmeal) and an apple. (In this case the logical OR is used for statements about his main dish, and logical AND is used for adding an apple to his breakfast.
    e. Every morning John eats an omelet or (a bowl of oatmeal and an apple). (In this case the logical OR is used for statements about the omelet and the bowl of oatmeal AND an apple)

4. You meet two inhabitants: Ted and Zeke. Ted claims, 'Zeke could say that I am a knave.'
   Zeke claims that it's not the case that Ted is a knave.
   Can you determine who is a knight and who is a knave?

5. You meet two inhabitants: Ned and Zoey. Zed says that it's false that Zoey is a knave. Zoey claims, 'I and Ned are different.'
   Can you determine who is a knight and who is a knave?

6. Draw two rays AB and CD in such way that their intersection is
    a. a point
    b. a segment
    c. a ray
    d. they don't intersect at all.

7. There are 4 people in the family. If Masha's scholarship is doubled, the total income of the whole family will increase by 5%; if instead the mother's salary is doubled – by 15%; if the father's salary is doubled – by 25%. By what percentage will the total income of the whole family increase if the grandfather's pension is doubled?
8. Evaluate:

$$\frac{(999^{-1} - 1000^{-1})(999^{-1} + 1000^{-1})}{(1000^{-1} - 999^{-1})^2}$$

9. Simplify the following expressions (combine like terms):

$a.\ \ 7a + (2a + 3b);$ $b.\ \ 9x + (2y - 5x);$
$c.\ \ (5x + 7a) + 4x;$ $d.\ \ (5x - 7a) + 5a;$
$e.\ \ (3x - 6y) - 4y;$ $f.\ \ (2a + 5b) - 7b;$
$g.\ \ 3m - (5n + 2m);$ $h.\ \ 6p - (5p - 3a);$

10. Multiply expessios.

$a.\ \ (a + 2)(a + 2);$ $f.\ \ (a + 1)(a + 3);$
$b.\ \ (3 + y)(y + 4);$ $g.\ \ (c + d)(c - 2d);$
$c.\ \ (3 + x)(3 - x);$ $h.\ \ (y - 2)(3 - y);$
$d.\ \ (x - y)(x + y);$ $i.\ \ (x - m)(x - m);$
$e.\ \ (2a + c)(a + ac);$ $j.\ \ (2d + 3l)(2d + 3l);$