Worksheet 2

Prove the following statements

Write down what is the assumption/supposition and what are you trying to prove.

Remember definitions are your tools (or best friend)! Stick to the definitions.

1. Let a, b, and c be integers. If a divides b, then a divides bc.
    a. Assumption:
    b. To prove:
    c. Proof:

2. If x is an integer, then $x^2 + x + 3$ is an odd integer.
    a. Assumption:
    b. To prove:
    c. Proof:

3. The product of consecutive integers is an even integer.
    a. Assumption:
    b. To prove:
    c. Proof:

4. Let x be an integer. If 4 does not divide x^2, then x is odd.

    a. Assumption:

    b. To prove:

    c. Proof:

5. Let x be an integer. If 8 does not divide $x^2 - 1$, then x is even.

    a. Assumption:

    b. To prove:

    c. Proof:

6. If a, b, c are integers such that $a|b$ and $a|c$, then $a|(b + c)$.

    a. Assumption:

    b. To prove:

    c. Proof:

7. Let a, b and c be positive integers. The integer ac divides bc if and only if the integer a divides b.

    a. Assumption:

    b. To prove:

    c. Proof:

8. Let x be a real number. The quadratic $x^2 + 2x + 1 = 0$ if and only if $x = -1$.

    a. Assumption:

    b. To prove:

    c. Proof:

9. Let x be an integer. If $9x + 5$ is even, then x is odd.

    a. Assumption:

    b. To prove:

    c. Proof:

10. Let x be an integer. x^2 is even if and only if x is even.

    a. Assumption:

    b. To prove:

    c. Proof:

11. Let a, b be integers. ab is even if and only if a is even or b is even.

    a. Assumption:

    b. To prove:

    c. Proof:

12. Disprove by finding a counterexample:

    For all real numbers a and b, if $b^2 > a^2$, then $b > a$