Name____**ID** _________________________

Activity 3-1 (15 Jul 2021)

1. Prove the following statement:

If integer c divides both integers a and b, then c divides $a - b$.

(Hint: try direct proofs.)

Name____**ID** _________________________

Activity 3-2 (15 Jul 2021)

2. Prove the following statement: If x is irrational, then $\sqrt{x}$ is irrational.
(Hint: try proofs by contraposition.)

Name____**ID** _________________________

Activity 3-3 (15 Jul 2021)

3. Assume that x is a non-zero rational number. Prove that if y is irrational, then xy is irrational.
(Hint: try proofs by contraposition.)

Name____**ID** ________________________

Activity 3-4 (15 Jul 2021)

4. Prove that for any positive integer *n*, *n* is an odd number if and only if 5*n* + 6 is odd.

(Hint: To prove statement P <=> Q, you can prove that P => Q and Q => P.)

Name____**ID** _________________________

Activity 3-5 (15 Jul 2021)

5. Prove the following statement: If x and y are integers and $x^2 + y^2$ is even, then $x + y$ is even.

Note: When you want to prove this statement: "If x and y are integers and $x^2 + y^2$ are even, then x + y is even. ". You can think of it as: "If x and y are integers, then (if $x^2 + y^2$, then x+y is even)". That is because (P and Q) => R is equivalent to (P => (Q => R)). Therefore, in this case, you can start by assuming that x and y are integers.

(Hint: proofs by cases.)