

Subject 20

Please, don't write on the exam paper.

Contrapositive

definition : the contrapositive of a logical sentence « if A then B » is « if (not B) then (not A) ».

(not A) is the logical negation of A. For example $\text{not}(x \geq 0)$ is $x < 0$.

property : the contrapositive is equivalent to the implication. It means that they are both true or false at the same time.

We also recall that the logical negation of « A or B » is « not A and not B »

We recall that if n is an odd integer, then n can always be written $n = 2k + 1$ (k another integer), and if n is even, then $n = 2k$.

1) Give the contrapositive of the following implications.

a) if $n > 2$ then $n^2 > 4$.

b) if there is sun or moon, then there is light outside.

2) Let p and q be 2 positive integers. We want to prove the following implication :

« If pq is even then p is even or q is even. »

a) Find the contrapositive of this implication.

b) Prove the contrapositive.

c) What is the conclusion ?