



Exam

Exercise 1: (3.5pts)

Draw the truth table of the following statements :

1. $(P \wedge Q) \Rightarrow Q$
2. $(P \vee \bar{Q}) \Rightarrow (\bar{P} \wedge Q)$

Exercise 2: (3.5pts)

1. Determine the length of h such that

$$2h(h + 1) = -1$$

2. Write h in trigonometric form.

Exercise 3: (5.5pts)

Let $f(x)$ be a function defined by its inverse function as :

$$f^{-1}: \mathbb{R} \rightarrow \mathbb{R}$$
$$x \rightarrow f^{-1}(x) = 2^x$$

1. Is f^{-1} injective ?
2. Show that the function f^{-1} is not surjective.
3. Restrict the codomain of f^{-1} so that it becomes a bijective function..
4. Determine f the inverse function of f^{-1} .

Exercise 4: (8.5pts)

Let $*$ and $\#$ be two operations on $\mathbb{C}^{-\{i\}}$ defined as follows :

$$\forall a, b \in \mathbb{C}^{-\{i\}} : a * b = a + b + iab \quad , \quad a \# b = a + b - i$$

1. Prove that $(\mathbb{C}^{-\{i\}} , *)$ is a group
2. Is $*$ distributive over $\#$?
3. Is $\#$ satisfies Identity element and the inverse element properties ?
4. Is $(\mathbb{C}^{-\{i\}} , \#)$ a group ?

Good luck