QUESTION TWO

a) Given that A and B are sets, simplify the following if possible

$$[(A\cap B)'\cap(A'\cup B)]'$$ **(5Marks)**

b) Determine the domain of the following function:

$$f(x)=\sqrt{\frac{x+1}{x-1}}$$ **(5 Marks)**

c) Let α and β be the roots of the quadratic equation $4x^2+3x-2=0$

Find a quadratic equation whose roots are α^2 and β^2 **(5 Marks)**

d) Solve the given inequality $10-\sqrt{2x+7}\leq 3$ **(5 Marks)**

e) Solve for x and y given that $\frac{1}{x+iy}+\frac{1}{1+3i}=1$ **(5 Marks)**

QUESTION THREE

a) Sketch the graph of the function $k(x)=|2x-1|-|x+2|$ **(5 Marks)**

b) Using synthetic division find the quotient and the remainder when $f(x)=x^3+2x^2+x-2$ is divided by $x-(1+i)$. **(5 Marks)**

c) Let **R**, the set of real numbers be the universal set. If $A=[-7,8)\cup[11,\infty)$ and $B=[0,20]$, find the following sets and display them on the number line:

(i) A'. **(2.5 Marks)** (ii) $A\cap B$. **(2.5 Marks)**

d) Express $\frac{\sqrt{3}+1}{\sqrt{3}-1}+\sqrt{3}-1$ in the form $a+b\sqrt{3}$ where a and b are rational numbers. **(5 Marks)**

e) Determine whether the function $f(x)=x^5+x^3+x$ is even, odd or neither **(5 Marks)**

MA110 – Mathematical Method

Time allowed: Two hours (2:00 hours)

Instructions:

1. You must write your **Name,** your **Computer Number and programme of study** on your answer sheet.
2. Calculators are **not** allowed in this paper.
3. There are three (3) questions in this paper, Attempt **All** questions and show **detailed** working for full credit

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QUESTION ONE

a) Express $2.07\overline{2}$ as a fraction $\frac{a}{b}$ in its simplest form where a and b are integers and $b \neq 0$. **(5 Marks)**

b) Given the rational function $f(x) = \frac{x^2+2}{x-1}$. Sketch its graph indicating its domain and range, all the asymptotes and intercepts. **(5 Marks)**

c) Given that $\sqrt{7}$ is an irrational number, Show that $2+\sqrt{7}$ is also an irrational number **(5 Marks)**

d) Verify that the two given functions are inverses of each other

$$f(x) = x^3 + 1 \text{ and } g(x) = \sqrt[3]{x-1}$$ **(5 Marks)**

e) Define an operation $*$ on the set of real numbers by $a * b = a^b$

i). Is $*$ a binary operation on the set of real numbers ? Give reason for your answer. **(1 Marks)**

ii). Is the operation commutative? **(2 Marks)**

iii). Evaluate $(3 * 2) * -2$ **(2 Marks)**