Contents

1 Decidability

Hello welcome to the section.

Corollary 1.1. *A language is decidable if* $\exists$ *a non deterministic Turing Machine that recognizes it.*

Theorem 1.2. *A language is Turing Recognizable if and only if some enumerator enumerates it.*

Theorem 1.3. *The class of Fontext Free Languages is a proper subset of the Turing Recognizable languages.*

Hilbert's 10th Problem: Given a polynomial with integer coeficients, does there exist an integer root to that polynomial.

$$D = \{p|\text{p is a polynomial over one variable}\}$$

$$F = \{p|\text{p is a polynomial over one or more variables}\}$$

Theorem 1.4. *The class of Turing Recognizable Languages is closed under* $\cup$.

Proof. Let A, B be Turing Recognizable Languages.
$\exists$ Turing Machines $M_A, M_B, L(M_A) = A, L(M_B) = B$.
We want Turing Machine M such that $L(M) = A \cup B$
On input w, M does:
1. run M_A and M_B in parallel on w
-if M_A or M_B then halt and accept
-if M_A and M_B then halt and reject

Claim. $L(M) = A \cup B$

Let $w \in L(M)$ $w \in A \cup B$ etc..... □

2 The Next Section

Hello this is another section.