Q1

①. CFG : $\Sigma = \{a, b\}$

② CFG accepts a given word is decidable

Proof:

In this CFG, redness is decidable, redness it accepts every word of length 3 that begin with a, so redness is given a finite language. it knows that there are a finite length. Therefor, the redness can be descrbed by a DFA or regular expression. Regul expression and DFA ~~decide~~ decide regular languages, which are subset of decidable languages, redness can also be accepted or rejected by TM.

In conclusion, redness is decidable.

Q_2:

∵ In this CFG, extreme redness is undecidable, which is accepts every word that begin with a.

① CFG: $\Sigma = \{a, b\}$

② The language of given CFG is Σ^* is undecidable

Proof:

First: In this statement we know that the CFG is extremly redness is accepts every word begin with a.

∴ Extreme red accepts : T : $\{a.\Sigma^*\}$

otherwise : F : $(b.\Sigma^*, \varepsilon)$

∵ CFG : $\Sigma = \{a, b\}$

∴ $\{a, b, \varepsilon\}$ are all subsets of Σ^*.

Then:

① we can assume extreme redness is decidable

② Then ①implies Σ^* is Ture

③ Then② imples Σ^* is decidable

But we know that language of a given CFG is Σ^* is undecidable, so it's ~~Conflict~~ contradiction with Σ^* is decidable.

In Conclusion Contradiction!

so, extreme redness is undecidable.