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HW 6

9.1

7. if L_1 is recursive and L_2 is recursively enumerable

Since L1 is always able to decide whether a string accept or reject but since L2 is semi decideable So if you don't know what rejects aka L2 when L2-L1 it will still continue to loop so L2-L1 is still recursively enumerable

9.2

2.

$S \to TH$

$T \to aTa \mid Tb \mid c$

$Ca \to CPa$

$Cb \to CPb$

$Pba \to aPb$

$Paa \to aPa$

$Pbb \to bPb$

$Pab \to bPa$

$Pa\# \to \#a$

$Pb\# \to \#b$

$C\# \to \lambda$

Eaba

Caaba#

CPaaba#

CaPaba#

CabPaa#

CabaPa#

Cabaa#a

CPabaa#a

CbPaa#a

CbaPa#a

Cbaa#aa

CPbaa#aa

CaPb#

Ca#baa

CPa#baa

C#abaa

abaa

3.

$S \to T\#$

$T \to T1 \mid C$

$C1 \to 1C$

$C1\# \to 1$

$C\# \to \lambda$

$S \to 3$

$11111 \to 111$

C11111#

1C1111#

11C11#

111C#

111

b.

c.

T →

4.

4. $|S| \% 3 == 0$

$S \to T\#$

$T \to Ta \mid Tb \mid C$

$Caaa \to C$

$Cbbb \to C$

$Cabb \to C$

$Caab \to C$

$Caba \to C$

$Cbaa \to C$

$Cbab \to C$

$Cbba \to C$

$C\# \to win$

a b a b a a

$T\# \to Cababaa\# \to Cbaa\#$

$\to C\# \to win$

abbab

$T\# \to Cabbab\# \to Cab\#$ X

$C\# \to win$

Chapter 10

1. • Assume there is a machine A that decides whether a turning machine M accepts M
   • construct a new machine that is the complement of M called M' that when inputted M makes a M on some w
   • Then M' accepts M if and only if M accepts w
   • But determining whether M accepts w is the halting problem which is undecidable so this ends up being a contradiction.
   • so a Turning Machice accepting the empty string is undecidable