CSC231 Project2

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1. Regular Expression for Language 1 is $(GT|C|\epsilon)(AG(AG)^*)(CT(CT)^*)G(GC|\epsilon)$
2. Regular Expression for Language 2 is $(04|06|09|11) - ((0|1|2)[0-9]|30)|(01|03|05|07|08|10|12) - ((0|1|2)[0-9]|30|31)|02 - ((0|1)[0-9]|20|21|22|23|24|25|26|27|28)$
3. Regular Expression for Language 3 is $(00^*11^*22^*11^*00^*)|(00^*22^*00^*)$

[0-9] means symbol $\backslash\backslash p\{Digit\}$ which means the number ranging from 0 to 9.

Explanation

Language 1

For Language 1 regular expression, union of $(GT|C|\epsilon)$ means an optional GT or C at the beginning of the word. $AG(AG)^*CT(CT)^*$ means one or more instances of AG followed by one or more instances of CT. $G(GC|\epsilon)$ means after one or more instances of AG and CT, follows by exactly one G and an optional GC at the end.

Language 2

This part (04|06|09|11) means union of months that only have 30 days. $((0|1|2)[0-9]|30)$ means the union of $01, 02, 03, \ldots, 09|10, 11, \ldots, 19|20, 21, \ldots, 29|30$, which represents all possible number from 00 to 30.
(01|03|05|07|08|10|12) means the months that have 31 days, and $((0|1|2)[0-9]|30|31)$ means the union of previous set(all possible number from 00 to 30) and 31. This means all number from 00 to 31.
In the last part of the big union, 02 means February, and $((0|1)[0-9]|20|21|22|23|24|25|26|27|28)$ means the union of $01, 02, 03, \ldots, 09, 10, 11, \ldots, 19$ and 21,22,23,24,25,26,27,28. This part means all possible number from 00 to 28. Taking the union of all three will het the optimal regular expression.

Language 3

$(00^*11^*22^*11^*00^*)$ means the case that ascending component has one or more 1s. 00^* means one or more 0s to start. 11^* means followed by one of more 1s. 22^* means one or more 2s. The next 11^*00^* means in descending component, there must be one or more 1s followed by one or more 0s.
$(00^*22^*00^*)$ means the case of not any 1s in the ascending component. 00^*22^* is the ascending component and 00^* mean the descending component.