Homework # 2 - Question #3 (Resubmitted)

The preliminary intuition for this grammar is very simple. Apart from 0, all binary numbers divisible by 4 ends with 000 or 100. The leading bits can form any binary number.

So, the number is: 0 or *Any Binary Number* having 000 or 100 in the end. The regular expression is:
$1(0|1)^*(000|100) \mid 0 \mid 100$

Hence, the grammar is given below. Non-terminals are highlighted with <>.

<GOAL> → 0 | 100 | 1<BINARY-NUMBER>000 | 1<BINARY-NUMBER>100
<BINARY-NUMBER> → <BIT> | ϵ
<BIT> → <BIT><BIT>
<BIT> → 0 | 1