CFG Challenge Problems

Try these again, from Kahoot.it:

1. Create a grammar from the alphabet {0,1} for... all strings having an odd length.

2. Create a grammar from the alphabet {0,1} for... strings that start or end with the same symbol.

3. Create a grammar from the alphabet {0,1} for... strings with at least three ones.

Try these again, from class:

Assume for the following the alphabet is {0,1} or otherwise specified:

4. {w | w is a palindrome, or $w = w^R$ } NOTE: please don't post the answer to this one, since it's a homework question. The hint was:
   S → 0 ? 0 | 1 ? 1 | ϵ

5. {w | w contains more 1s than 0s}

6. {w | |w| is odd}

7. {w | |w| is odd and the middle symbol is a 0}

8. {w | w starts and ends with the same symbol}

9. {w | w contains at least three 1s}

10. {w#x | w^R is a substring of x}

Try groking why these are NOT context-free:

11. {w#x | w is a substring of x}

12. $\{0^n 1^n 0^n 1^n \mid n \geq 0 \}$