13(d)

I wasn't super satisfied with any of the solutions I got for the regular expression to NFA conversion. So I am giving here a solution to 13 (d).The original language was:

$$L=\{w| \ 2n_a(w)+3n_b(w) \text{ is even}\}$$

Notice 2*anything is even, so only need to force $3n_b(w)$ to be even. This happens if w has an even number of b's. So a regular expression for this language is (a*ba*ba*)*.

Converting to NFA

To make an NFA for this regular expression, we make a regular expressions for:

1. a

2. a*

3. b

4. a*b

5. a*ba*b

6. a*ba*ba*

7. (a*ba*ba*)*