Do the following exercises from Beachy-Blair:

Page 371: 6
Page 375: 1, 2, 3

Supplemental Exercises (i.e., not from the text).

1. According to Example 8.1.1 $\text{Gal}(\mathbb{Q}(\sqrt{2})/\mathbb{Q}) = \langle \text{id} \rangle$. Show that $\text{Gal}(\mathbb{Q}(\sqrt[4]{2})/\mathbb{Q}) \neq \langle \text{id} \rangle$ by finding an explicit nonidentity automorphism of $\mathbb{Q}(\sqrt[4]{2})$ over $\mathbb{Q}$. *Hint:* Lemma 6.4.3 may be useful.

2. Determine the Galois group $\text{Gal}(\mathbb{GF}(2^{12})/\mathbb{GF}(2^2))$. 