Math 5320, 4/16/18 Name:

Worksheet 33: Unsolvability of the quintic

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1. Last time we proved that $G(\mathbb{Q}(\sqrt{2}, \sqrt{3})/\mathbb{Q}) \cong (\mathbb{Z}/(2) \times \mathbb{Z}/(2), +)$ where and the subroup corresponding to $\mathbb{Q}(\sqrt{6})$ is the group containing $(0, 0)$ and $(1, 1)$.

   Is $\mathbb{Q}(\sqrt{6})/\mathbb{Q}$ Galois? What are some different methods you could use to answer this question?

2. Suppose we have a polynomial $p(x) \in F[x]$ and let K be its splitting field. Show that the degree of any irreducible factor of $p(x)$ divides $[K : F]$ and that no prime factor of $[K : F]$ can be bigger than the degree of any irreducible factor of $p(x)$.

Check this box if you would like feedback ☐