Math 5320, 4/2/18 Name:

Worksheet 28: More Galois groups

1. What is $G(\mathbb{Q}(\zeta_p)/\mathbb{Q})$?

2. Let $h(x) \in \mathbb{Z}[x]$. Why is it true that $h(x^p) \equiv (h(x))^p \bmod p$? I suggest starting out with the case when $h(x)$ has degree 1.

3. Let ζ_n be the n-th primitive root of unity given by $e^{\frac{2\pi i}{n}}$. Let $1 \leq m < n$ a number not relatively prime with n, so $\gcd(m, n) = k > 1$. Why is ζ_n^m not a root of the irreducible polynomial of ζ_n over $\mathbb{Q}$?

Check this box if you would like feedback ☐