**Name:** _____

1. Find the minimal polynomial for $\frac{1+\sqrt{3}}{5}$ in $\mathbb{Q}[x]$.

2. Is $\frac{1+\sqrt{3}}{5} \in \mathbb{Q}(\sqrt{3})$? Briefly explain.

3. Is $\mathbb{Q}(\sqrt{3})$ the splitting field for the polynomial you found in question 1? Briefly explain.

4. Is there an automorphism of $\mathbb{Q}(\sqrt{3})$ which sends $\sqrt{3}$ to $\frac{1+\sqrt{3}}{5}$? Explain how you know using polynomials.

5. Find a non-identity element of the Galois group $\mathrm{Gal}(\mathbb{Q}(\sqrt{3})/\mathbb{Q})$, and say what it does to $\frac{1+\sqrt{3}}{5}$.