SME M2 Training Problems

Ted Szylowiec

tedszy@gmail.com

Some Problems may be harder than usual (or more advanced.) They are marked with a dot •. Problems that are possibly even harder (and even more advanced) are marked with two dots ••. All problems are worth doing! Try to do all of them. Most don't take very long. Some problems include answers.

1. Show that $n^4 + 10n^3 + 27n^2 + 10n + 1$ is a perfect square for all n. Do it by writing it in the form $(an^2 + bn + c)^2$ and finding the coefficients a, b, c.

2. Show that $n^4 - 14n^3 + 51n^2 - 14n + 1$ is a perfect square.

3. Show that $n^4 + 14n^3 + 51n^2 + 14n + 1$ is a perfect square.

4. • Show that $n^6 + 2n^5 + 5n^4 + 6n^3 + 6n^2 + 4n + 1$ is a perfect square.

5. • Show that $n^6 + 10n^5 + 27n^4 + 12n^3 + 11n^2 + 2n + 1$ is a perfect square.

6. • Show that $n^6 + 4n^5 + 10n^4 + 14n^3 + 13n^2 + 6n + 1$ is a perfect square.