

The homework is due on November 16.

Question 1 (5 points) Use *Excel* to implement Newton's algorithm: Compute approximations of $\sqrt{2}$ and $\sqrt[5]{17}$.

Question 2 (5 points) Let $f(x)$ be a polynomial. Given the values $f(k)$ for $k \in \mathbb{Z}$, the first difference values $d_1(k)$ are defined for $k \in \mathbb{Z}$ by setting

$$d_1(k) = f(k) - f(k - 1).$$

The second differences $d_2(k)$ are similarly defined as consecutive differences of the first difference values, etc:

$$d_2(k) = d_1(k) - d_1(k - 1).$$

Using *Excel*, illustrate for $n = 2, 3, 4$ that for a polynomial with degree n the n th differences are constant.

(This is a generalization of the fact that a linear function has constant slope. Actually, the converse of this is also true: If a polynomial has constant n th differences, then its degree is at most n . This “pre-calculus” characterization of polynomials is due to Isaac Newton.)