



MATH 1401 unit 3 DF - MATH 1401 unit 3 DF

College Algebra (University of the People)

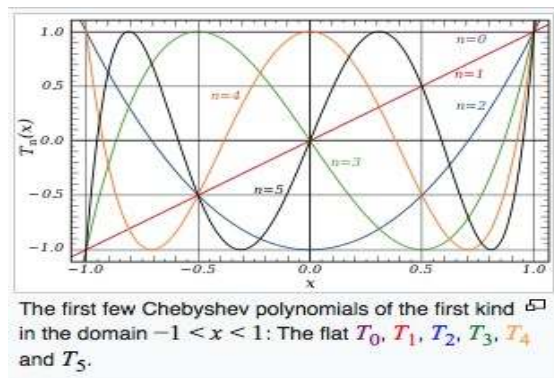
Chebyshev polynomial is one of the widely known polynomial function when it comes to polynomials and its application in the field of science and technology and everyday life with a general formula

$$T_n(x) = \sum_{k=0}^{\lfloor \frac{n}{2} \rfloor} \binom{n}{2k} (x^2 - 1)^k x^{n-2k}$$

Explicitly indicating its first possible few polynomials of the

$$\begin{aligned} T_0(x) &= 1 \\ T_1(x) &= x \\ T_2(x) &= 2x^2 - 1 \\ T_3(x) &= 4x^3 - 3x \\ T_4(x) &= 8x^4 - 8x^2 + 1 \\ T_5(x) &= 16x^5 - 20x^3 + 5x \\ T_6(x) &= 32x^6 - 48x^4 + 18x^2 - 1 \\ T_7(x) &= 64x^7 - 112x^5 + 56x^3 - 7x \\ T_8(x) &= 128x^8 - 256x^6 + 160x^4 - 32x^2 + 1 \\ T_9(x) &= 256x^9 - 576x^7 + 432x^5 - 120x^3 + 9x \\ T_{10}(x) &= 512x^{10} - 1280x^8 + 1120x^6 - 400x^4 + 50x^2 - 1 \\ T_{11}(x) &= 1024x^{11} - 2816x^9 + 2816x^7 - 1232x^5 + 220x^3 - 11x \end{aligned}$$

Instances of the use of polynomial functions can be seen in calculations of antenna array. [wikipedia.org/](https://en.wikipedia.org/) defines antenna array as a group of multiple antennas connected together working together as one. Chebyshev polynomials is used in the calculations of the antenna radiation power of each and every antenna ultimately making space for the control of the ratio of the amplitude of both the side and main lobes. It has the general graph as below



Reference:

Chebyshev polynomials. Retrieved September 20, 2021 from https://en.wikipedia.org/wiki/Chebyshev_polynomials