

The Taylor Series is one of a family of approaches used to build approximation functions.

### Why Approximate

There are certain cases when it is useful to use approximations.

An example demonstrating the value in approximation is "how long does it take to cook a chicken?".

This example tries to relate a chicken's mass and its cooking time.

Such an example's function has many assumptions/constraints:

- certain oven type
- certain chicken configuration type (chopped, minced pieces)
- heat transfer properties
  - ↳ a non-linear function by mass.

Chicken cooking time

$$t(m, T, \text{OvenFactor}, \text{ChickenShapeFactor})$$

$$\begin{aligned} &= 7.33m^5 - 72.3m^4 + 253m^3 - 368m^2 + 250m + 0.02 \\ &\quad + \text{OvenFactor} \\ &\quad + \text{ChickenShapeFactor} \end{aligned}$$

\* Formula is sensitive to many parameters.

↳ Can simplify by making assumptions

↳ Can approximate certain region/points in the graph

With Taylor Series can focus on a single point, that is accurate around that point of interest. The accuracy deteriorates likely the farther from that point.

With that point the Taylor Series can be used to create a simpler functional model:

$$t^*(m) \approx 50.0m + 15.$$

Approximation is done for

- convenience
- computation / speed
- valid assumption / constraints