Section 11.11: Application of Taylor Polynomials

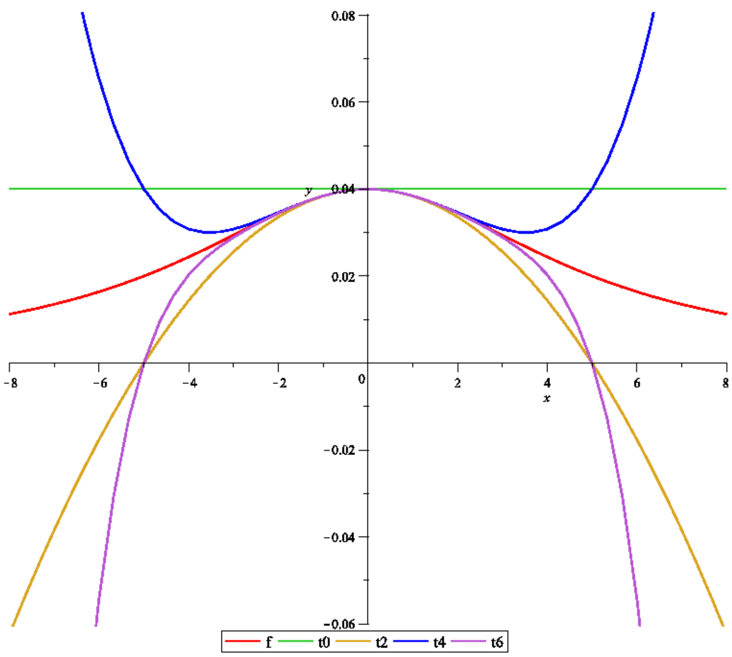
Taylor Polynomials.

The Taylor series of a function, $f(x)$, can be expressed: $f(x) = \displaystyle\sum_{k=0}^{\infty} \frac{f^{(k)}(a)}{k!}\,(x-a)^k$.

The **n-th degree Taylor polynomial** of $f(x)$ at a, denoted T_n is given by

$$T_n(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + ... + \frac{f^{(n)}(a)}{n!}(x-a)^n$$

The following graph shows the function $f(x) = \dfrac{10}{x^2+25}$ and T_0, T_2, T_4, and T_6.



Example: Find the Taylor polynomials, T_1, T_2, and T_3, for $f(x) = xe^x$ centered at $a = 2$.

Example: Find the Taylor polynomials, T_1, T_4, T_5, and T_7 for $f(x) = \dfrac{x}{1+5x^3}$ centered at $a = 0$

Example: Express $f(x) = 2x^3 + 4x^2 + 7x + 6$ as a Taylor polynomial(series) about $a = 2$.