

1. Let $f(x) = \tan x$. Write a second order Taylor polynomial at $x_0 = 0$, i.e.

$$T_{\tan x, 0, 2}(x).$$

2. Find the intervals where the function

$$f(x) = 3x - x^3$$

are increasing and where it is decreasing. Determine local extremes and their values.

3. Solve

$$\int \frac{1}{(1+x)\sqrt{x}} dx.$$

4. Find a solution to

$$y' - 2y = e^{4x}$$

fulfilling $y(0) = 2$.