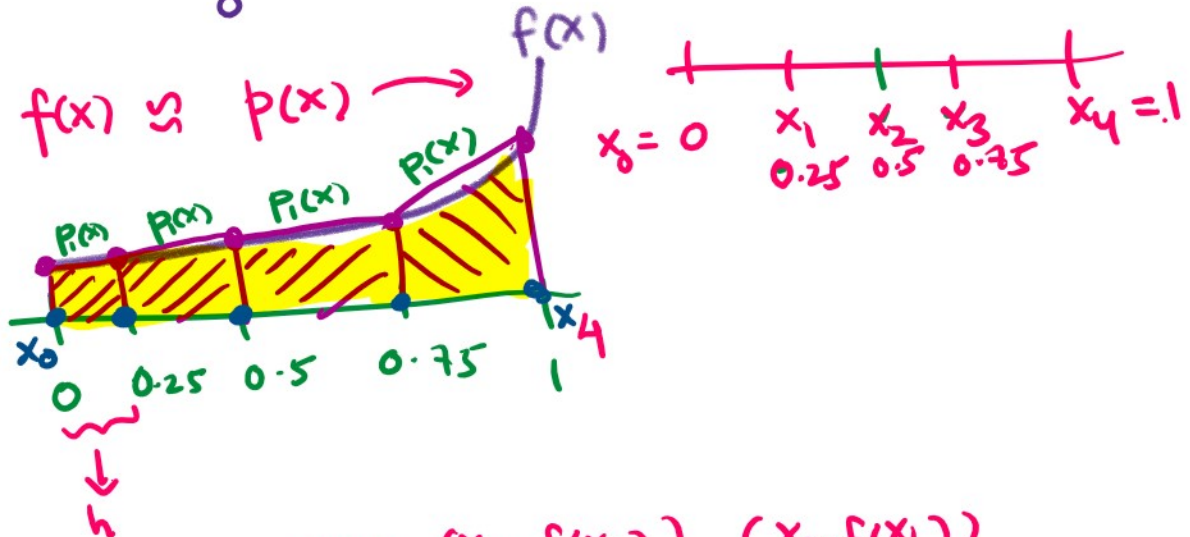


$$I = \int_0^1 f(x) dx \quad f(x) \text{ any function}$$



$p(x)$ interpolates $(x_0, f(x_0))$ $(x_1, f(x_1))$

$$\int_0^1 f(x) dx = \int_{x_0}^{x_1} f(x) dx + \dots + \int_{x_3}^{x_4} f(x) dx$$

$$\approx \int_{x_0}^{x_1} p(x) dx + \dots + \int_{x_3}^{x_4} p(x) dx$$

$$\underbrace{\left(\frac{h}{2} f(x_0) + \frac{h}{2} f(x_1) \right)}_{\text{trapezoidal rule}} \int_{x_1}^{x_2} p(x) dx$$

$$\underbrace{\left(\frac{h}{2} f(x_1) + \frac{h}{2} f(x_2) \right)}_{\text{trapezoidal rule}} \int_{x_2}^{x_3} p(x) dx$$

$$\underbrace{\left(\frac{h}{2} f(x_2) + \frac{h}{2} f(x_3) \right)}_{\text{trapezoidal rule}} \int_{x_3}^{x_4} p(x) dx$$

$$\underbrace{\left(\frac{h}{2} f(x_3) + \frac{h}{2} f(x_4) \right)}_{\text{trapezoidal rule}}$$

$$\frac{h}{2} f(x_0) + 2h \frac{f(x_1)}{2} + 2h \frac{f(x_2)}{2} + \dots + 2h \frac{f(x_{n-1})}{2} + \frac{h}{2} f(x_n)$$

$$T_n(f) = \frac{h}{2} f(x_0) + h f(x_1) + \dots + h f(x_{n-1}) + \frac{h}{2} f(x_n)$$