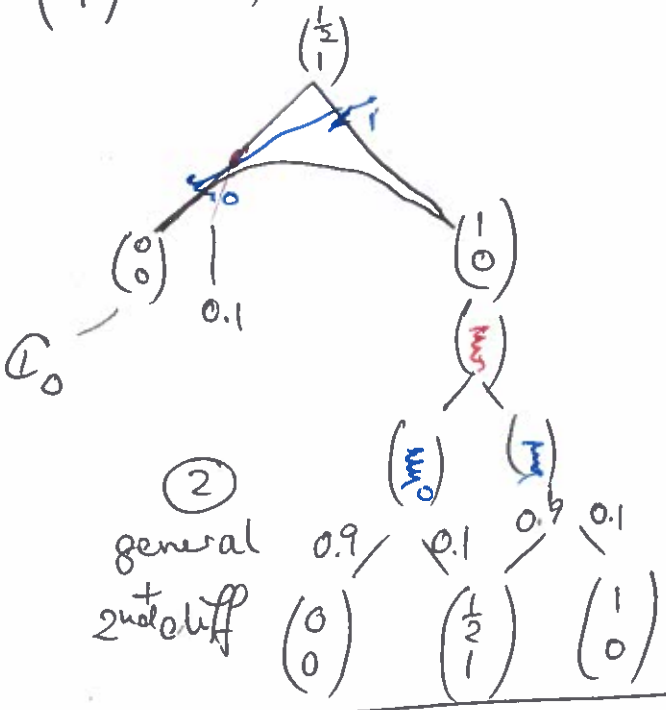
$$\binom{n}{i}(1-t)^{n-i}t^i = B_i^n(t) \quad \text{scalar valued}$$



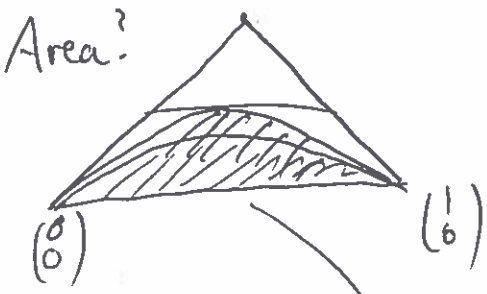
② general + 2nd diff

$$p(t) = \underline{\binom{0}{0}B_0^{(1)}} + \binom{\frac{1}{2}}{1}B_1^{(1)} + \binom{1}{0}B_2^{(1)}$$

$= \ldots$ ① convert to power form (multiply out)

③ $2\left[\binom{1}{0} - 2\binom{\frac{1}{2}}{1} + \binom{0}{0}\right] = 2\binom{0}{-2} = \binom{0}{-4}$

Area?



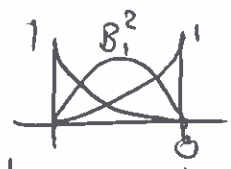
$$\int_0^1 p(t) = \sum_{i=0}^{n} C_i \underbrace{\int_0^1 B_j^n(t)}_{\frac{1}{n+1}}$$

$$= \sum \frac{C_i}{n+1}$$

ⓐ $\frac{d}{dt}B_j^{n+1}(t) = \left(B_{j-1}^n - B_j^n\right)(n+1)$

$\underline{0 \ldots 0\ 1\ 0\ 0\ 0}$
$\quad\quad j$

ⓑ $\int_0^1 \frac{d}{dt} B_j^{n+1}(t) = B_j^{n+1}(1) - B_j^{n+1}(0) = \begin{cases} -1 & j=0 \\ 0 & \text{else} \\ 1 & j=n+1 \end{cases}$



ⓒ $0 = \int_0^1 \frac{d}{dt} B_j^{n+1} = (n+1)\int_0^1 B_{j-1}^n - B_j^n$

$0 < j < n+1$ $\Rightarrow$ $\int_0^1 B_{j-1}^n = \int_0^1 B_j^n$

ⓓ $\sum_{j=0}^{n} B_j^n = 1 \Rightarrow \int_0^1 \sum_{j=0}^{n} B_j^n = 1$

ⓔ $\Rightarrow \int_0^1 B_j^n = \frac{1}{n+1}$

AREA = $\int_0^1 y(t) = \frac{0+1+0}{3}$

AREA $= \int_0^1 y(t)\,x'(t)\,dt$ — compute x'