

> restart;

> dp:=(f,g)->int(f\*g,x=-1..1);

$$dp := (f, g) \rightarrow \int_{-1}^1 f g dx$$

> nm:=f->sqrt(dp(f,f));

$$nm := f \rightarrow \sqrt{dp(f, f)}$$

> N:=7;

$$N := 7$$

> U:=[seq(x^k,k=0..N-1)];

$$U := [1, x, x^2, x^3, x^4, x^5, x^6]$$

> for i from 1 to N

do

tV[i]:=U[i];

for j from 1 to i-1

do

tV[i]:=tV[i]-V[j]\*dp(V[j],U[i]);

od;

V[i]:=tV[i]/nm(tV[i]);

od;

$$tV_1 := 1$$

$$V_1 := \frac{1}{2} \sqrt{2}$$

$$tV_2 := x$$

$$V_2 := \frac{1}{2} x \sqrt{6}$$

$$tV_3 := x^2$$

$$V_3 := \frac{3}{4} \left( x^2 - \frac{1}{3} \right) \sqrt{10}$$

$$tV_4 := x^3$$

$$V_4 := \frac{5}{4} \left( x^3 - \frac{3}{5} x \right) \sqrt{14}$$

$$tV_5 := x^4$$

$$V_5 := \frac{105}{16} \left( x^4 + \frac{3}{35} - \frac{6}{7} x^2 \right) \sqrt{2}$$

$$tV_6 := x^5$$

$$V_6 := \frac{63}{16} \left( x^5 + \frac{5}{21} x - \frac{10}{9} x^3 \right) \sqrt{22}$$

$$tV_7 := x^6$$

$$V_7 := \frac{231}{32} \left( x^6 - \frac{5}{231} + \frac{5}{11} x^2 - \frac{15}{11} x^4 \right) \sqrt{26}$$

> **solve(V[4]=0,x);**

$$0, \frac{1}{5} \sqrt{15}, -\frac{1}{5} \sqrt{15}$$

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