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> #  R. Gilmore
> #  The generating function for Legendre polynomials is introduced.
> #  The succesive derivatives are taken and evaluated at t=0.
> #  The results are printed as the successive Legendre polynomials.
> #
> #restart;
> GenLeg:=1/sqrt(1-2*x*t+t^2);
```

$$GenLeg := \frac{1}{\sqrt{1-2\,xt+t^2}}$$

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> nn:=10;
```

$$nn := 10$$

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> gg:=GenLeg:Leg[0]:=subs(t=0,gg):print(0,Leg[0]);for i from 1
to nn do gg:=diff(gg,t)/i:Leg[i]:=subs(t=0,gg):print(i,Leg[i]):od:
```

$0,\ 1$

$1,\ x$

$2,\ 3/2\,x^2 - 1/2$

$3,\ 5/2\,x^3 - 3/2\,x$

$4,\ \frac{35}{8}\,x^4 - \frac{15}{4}\,x^2 + 3/8$

$5,\ \frac{63}{8}\,x^5 - \frac{35}{4}\,x^3 + \frac{15}{8}\,x$

$6,\ \frac{231}{16}\,x^6 - \frac{315}{16}\,x^4 + \frac{105}{16}\,x^2 - \frac{5}{16}$

$7,\ \frac{429}{16}\,x^7 - \frac{693}{16}\,x^5 + \frac{315}{16}\,x^3 - \frac{35}{16}\,x$

$8,\ \frac{6435}{128}\,x^8 - \frac{3003}{32}\,x^6 + \frac{3465}{64}\,x^4 - \frac{315}{32}\,x^2 + \frac{35}{128}$

$9,\ \frac{12155}{128}\,x^9 - \frac{6435}{32}\,x^7 + \frac{9009}{64}\,x^5 - \frac{1155}{32}\,x^3 + \frac{315}{128}\,x$

$10,\ \frac{46189}{256}\,x^{10} - \frac{109395}{256}\,x^8 + \frac{45045}{128}\,x^6 - \frac{15015}{128}\,x^4 + \frac{3465}{256}\,x^2 - \frac{63}{256}$