In[27]:=
```
Clear["Global`*"]
```

In[30]:=
```
gramschmidt[w_, var_, interval_, n_] :=
 (* Density function, variable, interval and number of terms *)
 Module[{a, gram, ψ, ϕ},
  a[i_, j_] :=
    Integrate[w * var^(i + j), Join[{var}, interval], GenerateConditions → False];
  gram[m_] := Det[Table[a[i, j], {i, 0, m}, {j, 0, m}]]; gram[-1] = 1;
  ψ[m_] :=
  Det[Append[Table[a[i, j], {i, 0, m - 1}, {j, 0, m}], var^Range[0, m]]] // Simplify;
   ϕ[m_] := ψ[m] / Sqrt[gram[m - 1] × gram[m]]; Table[{k, ϕ[k]}, {k, 0, n}]]
```

In[25]:=
```
gramschmidt[Exp[-x^2], x, {-∞, ∞}, 6] // TableForm
```

Out[25]//TableForm=

0	$\frac{1}{\pi^{1/4}}$
1	$\frac{\sqrt{2}\ x}{\pi^{1/4}}$
2	$\frac{-1+2\ x^2}{\sqrt{2}\ \pi^{1/4}}$
3	$\frac{x\ (-3+2\ x^2)}{\sqrt{3}\ \pi^{1/4}}$
4	$\frac{3-12\ x^2+4\ x^4}{2\ \sqrt{6}\ \pi^{1/4}}$
5	$\frac{x\ (15-20\ x^2+4\ x^4)}{2\ \sqrt{15}\ \pi^{1/4}}$
6	$\frac{-15+90\ x^2-60\ x^4+8\ x^6}{12\ \sqrt{5}\ \pi^{1/4}}$

In[26]:=
```
gramschmidt[1, x, {-1, 1}, 3] (* Legendre *) // TableForm
```

Out[26]//TableForm=

0	$\frac{1}{\sqrt{2}}$
1	$\sqrt{\frac{3}{2}}\ x$
2	$\frac{1}{2}\ \sqrt{\frac{5}{2}}\ \left(-1+3\ x^2\right)$
3	$\frac{1}{2}\ \sqrt{\frac{7}{2}}\ x\left(-3+5\ x^2\right)$

In[32]:=
```
gramschmidt[1 / Sqrt[1 - x^2], x, {-1, 1}, 3] (* Chebyshev I *) // TableForm
```

Out[32]//TableForm=

0	$\frac{1}{\sqrt{\pi}}$
1	$\sqrt{\frac{2}{\pi}}\ x$
2	$\sqrt{\frac{2}{\pi}}\ \left(-1+2\ x^2\right)$
3	$\sqrt{\frac{2}{\pi}}\ x\left(-3+4\ x^2\right)$

In[33]:=
```
gramschmidt[Sqrt[1 - x^2], x, {-1, 1}, 3] (* Chebyshev  II *) // TableForm
```

Out[33]//TableForm=

0	$\sqrt{\frac{2}{\pi}}$
1	$2\sqrt{\frac{2}{\pi}}\,x$
2	$\sqrt{\frac{2}{\pi}}\,(-1+4x^2)$
3	$4\sqrt{\frac{2}{\pi}}\,x\,(-1+2x^2)$

In[34]:=
```
gramschmidt[Exp[-x], x, {0, ∞}, 3] (* Laguerre *) // TableForm
```

Out[34]//TableForm=

0	1
1	$-1+x$
2	$\frac{1}{2}(2-4x+x^2)$
3	$\frac{1}{6}(-6+18x-9x^2+x^3)$

In[35]:=
```
(* gramschmidt[x Exp[-x], x, {0, ∞}, 3] (* Arfken 10.3.4 - 6th E. *) // TableForm *)
```

In[36]:=