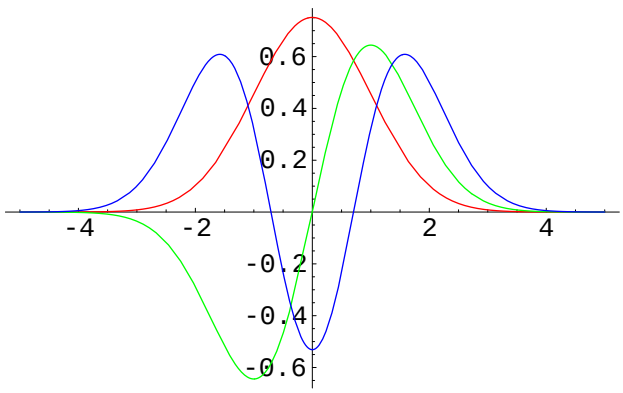
Oscilador armonico

```
(*  Definicion de las Funciones de Onda  *)
```

$$\text{phi}[n_, x_] := \sqrt{\frac{1}{\sqrt{\text{Pi}} * 2^n * n!}} * \text{Exp}\left[\frac{-x^2}{2}\right] * \text{HermiteH}[n, x]$$

```
(*  Grafico de las funciones  *)

Plot[ {phi[0, x], phi[1, x], phi[2, x]} , {x, -5, 5} ,
      PlotStyle -> {RGBColor[1, 0, 0], RGBColor[0, 1, 0], RGBColor[0, 0, 1] }  ] ;
```

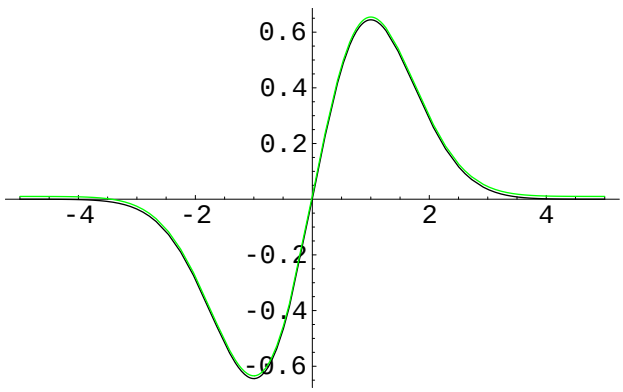



```
(* Chequeo de Normalizacion *)

m = 6;
NIntegrate[ phi[m, x]^2, {x, -5, 5}]
```

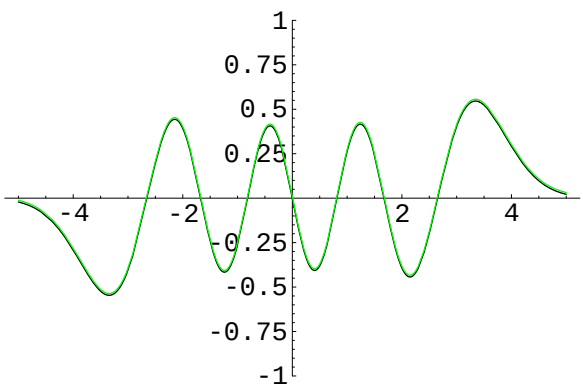
```
0.999977
```

```
(* Operadores de Creacion  *)

dx[n_, x_] := Derivative[0, 1][phi][n, x]
a†[n_, x_] := 1 / Sqrt[2] * ( -dx[n, x] + x * phi[n, x] )
```

```
(* Comparacion de las funciones generadas
  por operador de creacion, con las funciones analiticas  *)

(* chequeo para n=1  *)

ϵ = 0.01;
Plot[{phi[1, x], a†[0, x] + ϵ}, {x, -5, 5} ,
  PlotStyle -> {RGBColor[0, 0, 0], RGBColor[0, 1, 0]}];
```

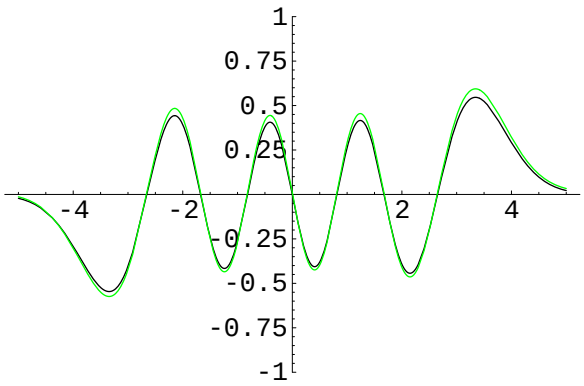



```
(* chequeo general  *)

m = 7;
Plot[{phi[m, x], 1 / Sqrt[(m)] * (a†[m - 1, x]) + ϵ},
  {x, -5, 5} , PlotStyle -> {RGBColor[0, 0, 0], RGBColor[0, 1, 0]},
  PlotRange → {-1, 1}];
```




```
(* Operadores de Aniquilacion  *)

a[n_, x_] := 1 / Sqrt[2] * ( dx[n, x] + x * phi[n, x] )
```

```
m = 7;
Plot[{phi[m, x], 1 / Sqrt[(m)] * (a[m + 1, x]) + ϵ},
  {x, -5, 5} , PlotStyle -> {RGBColor[0, 0, 0], RGBColor[0, 1, 0]},
  PlotRange → {-1, 1}];
```




```
HTMLSave["creationmath.html", "creation.nb"];
```