In[1]:=

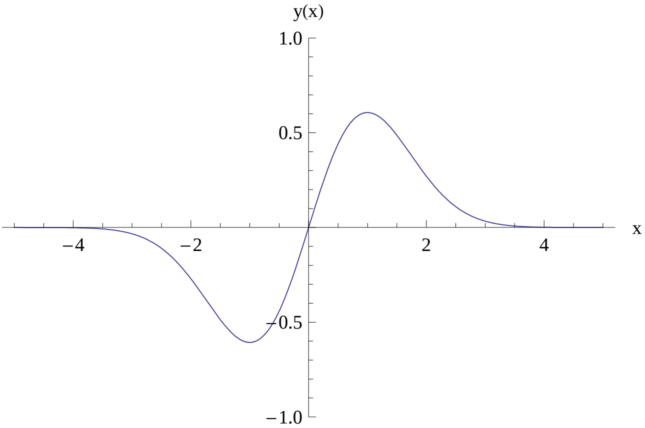
```
iv1 = y[0] == 0;
iv2 = y'[0] == 1;
diffeq = y''[x] + (x y'[x]) + 2 y[x] == 0;
sol = DSolve[{diffeq, iv1, iv2}, y[x], x]
y[x_] = y[x] /. sol[[1]]
Series[y[x], {x, 0, 7}]
Plot[y[x], {x, -5, 5}, PlotRange → {-1, 1}, AxesLabel → {"x", "y(x)"}]
iv3 = g[0] == 1;
iv4 = g'[0] == 0;
diffeq1 = g''[x] + (x g'[x]) + 2 g[x] == 0;
sol1 = DSolve[{diffeq1, iv3, iv4}, g[x], x]
g[x_] = g[x] /. sol1[[1]]
Series[g[x], {x, 0, 6}]
Plot[g[x], {x, -5, 5}, PlotRange → {-1, 1}, AxesLabel → {"x", "y(x)"}]
```

Out[4]= $\left\{\left\{y[x] \to e^{-\frac{x^2}{2}} x\right\}\right\}$

Out[5]= $e^{-\frac{x^2}{2}} x$

Out[6]= $x - \frac{x^3}{2} + \frac{x^5}{8} - \frac{x^7}{48} + O[x]^8$

Out[7]=




Out[11]= $\left\{\left\{g[x] \to \frac{e^{-\frac{x^2}{2}} \left(\sqrt{2}\, e^{\frac{x^2}{2}} \sqrt{x^2} - \sqrt{\pi}\, x^2 \,\text{Erfi}\left[\frac{\sqrt{x^2}}{\sqrt{2}}\right]\right)}{\sqrt{2}\sqrt{x^2}}\right\}\right\}$

Out[12]= $\frac{e^{-\frac{x^2}{2}} \left(\sqrt{2}\, e^{\frac{x^2}{2}} \sqrt{x^2} - \sqrt{\pi}\, x^2 \,\text{Erfi}\left[\frac{\sqrt{x^2}}{\sqrt{2}}\right]\right)}{\sqrt{2}\sqrt{x^2}}$

Out[13]= $1 - x^2 + \frac{x^4}{3} - \frac{x^6}{15} + O[x]^7$

Out[14]=