Plotting of differential equation and curves:

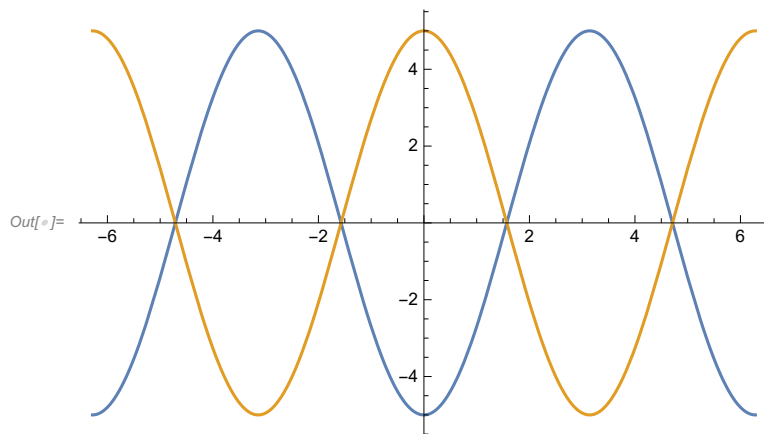*In[ ]:=* **eq = y''[x] + y[x]**

Out[ ]= $y[x] + y''[x]$

In[ ]:= **sol = DSolve[eq == 0, y[x], x]**

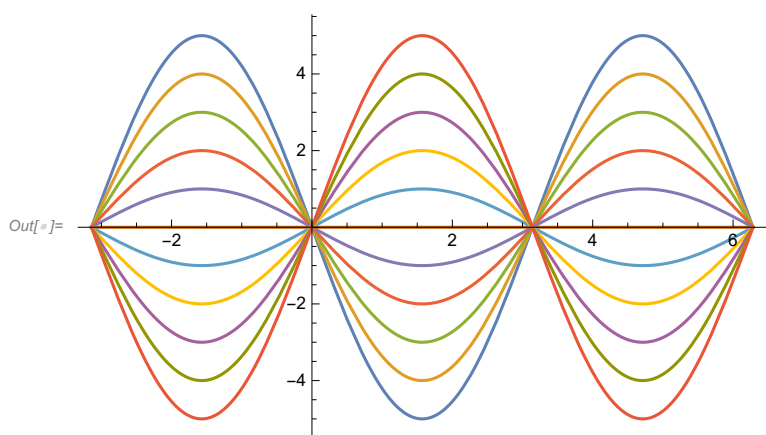*Out[ ]=* $\{\{y[x] \rightarrow C[1] Cos[x] + C[2] Sin[x]\}\}$

In[ ]:= **Plot[Evaluate[y[x] /. sol /. {C[2] → 0, C[1] → {-5, 5}}], {x, -2 Pi, 2 Pi}]**

Out[ ]=

In[ ]:= **Plot[Evaluate[y[x] /. sol /. {C[2] → 0, C[1] → Range[-5, 5]}], {x, -2 Pi, 2 Pi}]**

Out[ ]=
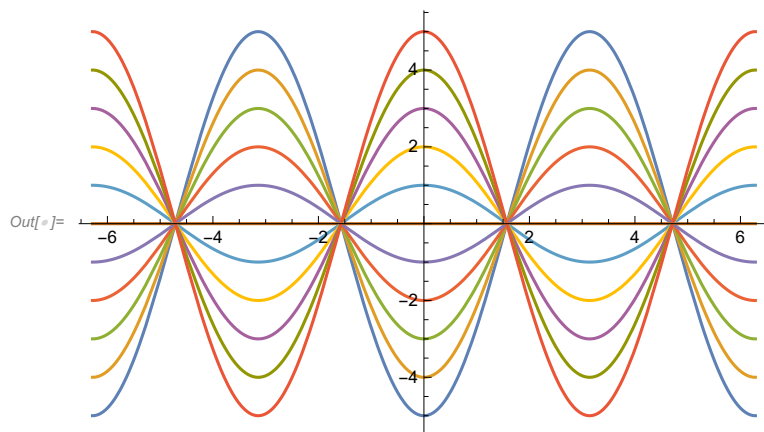
In[ ]:= `Plot[Evaluate[y[x] /. sol /. {C[1] → 0, C[2] → Range[-5, 5]}], {x, -Pi, 2 Pi}]`
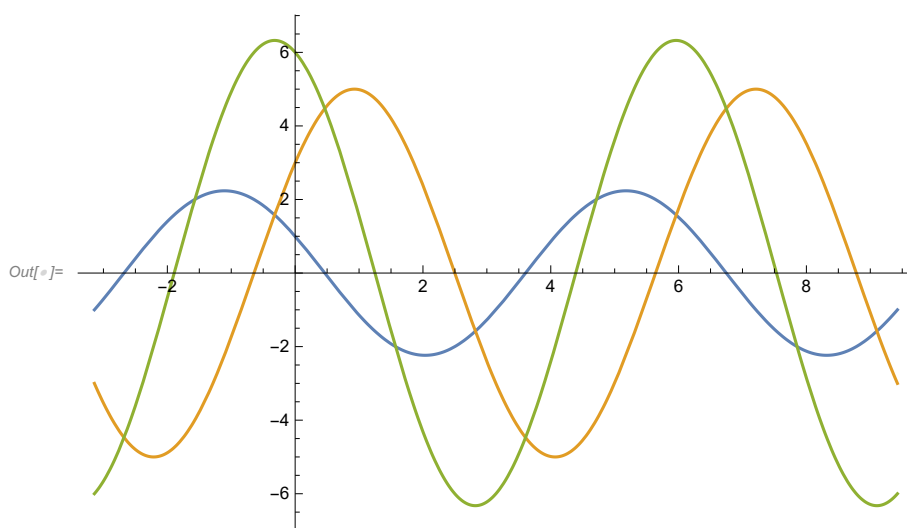
Out[ ]=

In[ ]:= `ClearAll`

Out[ ]= `ClearAll`

In[ ]:= `eqn = D[y[x], {x, 2}] + y[x]`

Out[ ]= $y[x] + y''[x]$

In[ ]:= `solution = DSolve[eqn == 0, y[x], x]`

Out[ ]= $\{\{y[x] \to C[1] \, Cos[x] + C[2] \, Sin[x]\}\}$

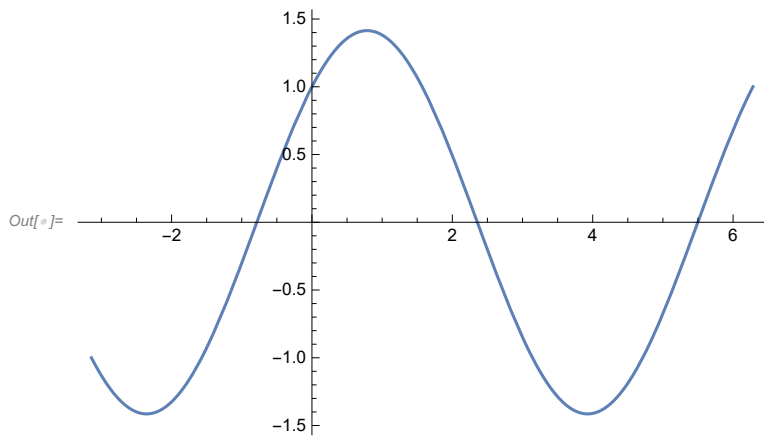*In[ ]:=* `Plot[Evaluate[y[x] /. solution /. {C[1] → {1, 3, 6}, C[2] → {-2, 4, -2}}], {x, -Pi, 3 Pi}]`

Out[ ]=

In[ ]:= `equation = y''[x] + y[x]`

Out[ ]= $y[x] + y''[x]$

In[ ]:= `solution = DSolve[{equation == 0, y[0] == 1, y'[0] == 1}, y[x], x]`

Out[ ]= $\{\{y[x] \to Cos[x] + Sin[x]\}\}$

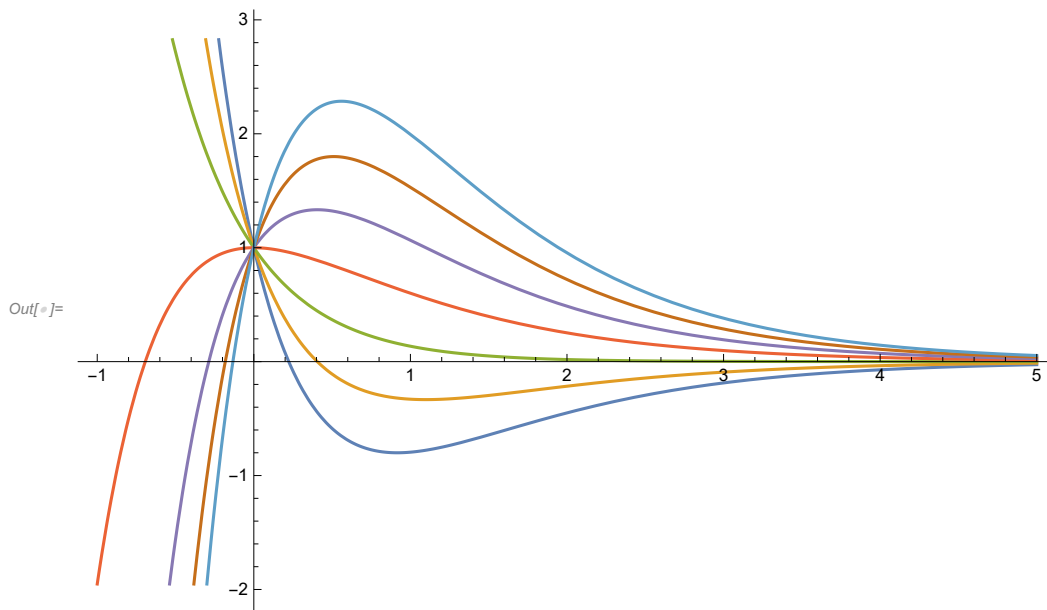*In[ ]:=* **Plot[Evaluate[y[x] /. solution], {x, -Pi, 2 Pi}]**

Out[ ]=

In[ ]:= **equation = y''[x] + 3 y'[x] + 2 y[x]**

Out[ ]= $2 y[x] + 3 y'[x] + y''[x]$

In[ ]:= **Sol = DSolve[{equation == 0, y[0] == 1, y'[0] == a}, y[x], x]**

Out[ ]= $\left\{\left\{y[x] \rightarrow e^{-2x} \left(-1 - a + 2 e^{x} + a\, e^{x}\right)\right\}\right\}$

In[ ]:= **Plot[Evaluate[y[x] /. Sol /. a → {-6, -4, -2, 0, 2, 4, 6}], {x, -1, 5}]**

Out[ ]=

In[ ]:= **eqn = y''[x] - 2 y'[x] + y[x]**

Out[ ]= $y[x] - 2 y'[x] + y''[x]$

In[ ]:= **solution = DSolve[{eqn == 0, y[0] == 3}, y[x], x]**

Out[ ]= $\left\{\left\{y[x] \rightarrow e^{x} \left(3 + x\, C[2]\right)\right\}\right\}$

In[ ]:= `Plot[Evaluate[y[x] /. solution /. C[2] → {-6, -4, -2, 0, 2, 4, 6}], {x, -2, 2}]`

Out[ ]=