y = y[x]
dy/dx = y'[x]
d2y/dx2 = y''[x]

DSolve[eqn, y[x],x]  Solve for y[x]

Q. y' + y = a sin(x)  y' = dy/dx

In[5]:=
```
DSolve[y'[x] + y[x] == a * Sin[x], y[x], x]
```

Out[5]=
$$\left\{\left\{y[x] \to e^{-x} C[1] + \frac{1}{2} a\,(-\text{Cos}[x] + \text{Sin}[x])\right\}\right\}$$

In[6]:=
```
DSolve[y'[x] + y[x] == a * Sin[x], y[x], x]
```

Out[6]=
$$\left\{\left\{y[x] \to e^{-x} C[1] + \frac{1}{2} a\,(-\text{Cos}[x] + \text{Sin}[x])\right\}\right\}$$

Q. 2xy y' - 4x^2 - 3y^2 = 0 and plot its five solutions.

In[13]:=
```
DSolve[y'[x] - 3 (1 - 4 x^2) == 0, y[x], x]
```

Out[13]=
$$\left\{\left\{y[x] \to 3x - 4x^3 + C[1]\right\}\right\}$$

In[14]:=
```
DSolve[y'[x] + y[x] == 0, y[x], x]
```

Out[14]=
$$\left\{\left\{y[x] \to e^{-x} C[1]\right\}\right\}$$

In[15]:=
```
DSolve[2 * x * y[x] * y'[x] - 4 x^2 - 3 y[x]^2 == 0, y[x], x]
```

Out[15]=
$$\left\{\left\{y[x] \to -x\sqrt{-4 + x\,C[1]}\right\}, \left\{y[x] \to x\sqrt{-4 + x\,C[1]}\right\}\right\}$$

In[22]:=
```
sol = DSolve[2 x * y[x] * y'[x] - 4 x^2 - 3 y[x]^2 == 0, y[x], x]
```

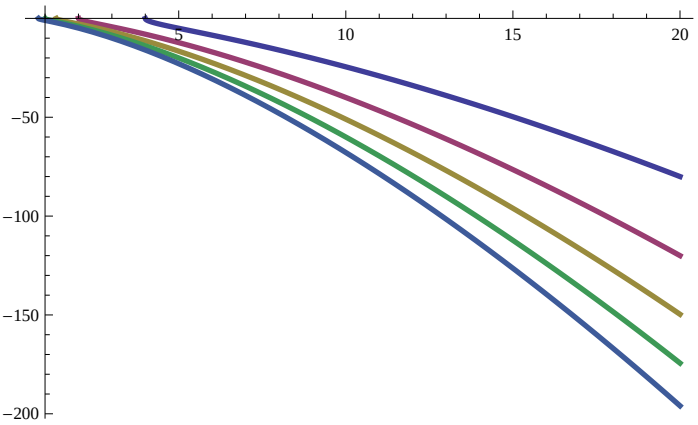
Out[22]=
$$\left\{\left\{y[x] \to -x\sqrt{-4 + x\,C[1]}\right\}, \left\{y[x] \to x\sqrt{-4 + x\,C[1]}\right\}\right\}$$

In[23]:=
```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

Out[23]=
$$\left\{-\sqrt{-4 + x}\ x,\ -x\sqrt{-4 + 2x},\ -x\sqrt{-4 + 3x},\ -x\sqrt{-4 + 4x},\ -x\sqrt{-4 + 5x}\right\}$$

In[37]:=
```
Plot[Evaluate[tab], {x, 0, 20}, PlotRange → All, PlotStyle → {Thickness[0.008]}]
```

Out[37]=




PlotLegends -> {tab[[1]], tab[[2]], tab[[3]], tab[[4]], tab[[5]]}

This will label the colors.

Q. y'' - x^2 = 0 and plot 10 solutions.

In[38]:=
```
sol = DSolve[y'[x] - x^2 == 0, y[x], x]
```

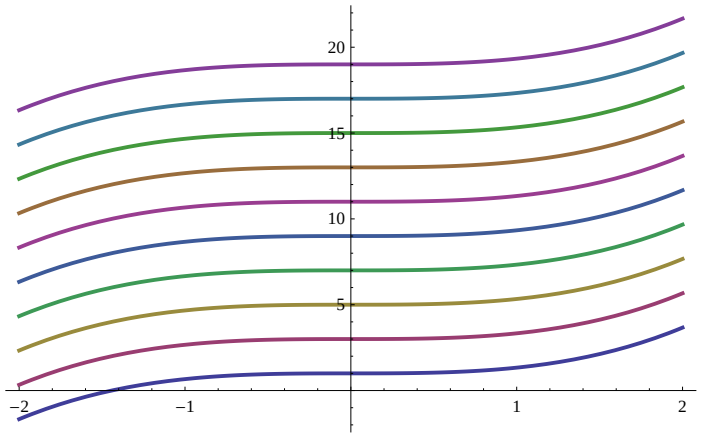
Out[38]=
$$\left\{\left\{y[x] \to \frac{x^3}{3} + C[1]\right\}\right\}$$

In[39]:=
```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 20, 2}]
```

Out[39]=
$$\left\{1 + \frac{x^3}{3},\ 3 + \frac{x^3}{3},\ 5 + \frac{x^3}{3},\ 7 + \frac{x^3}{3},\ 9 + \frac{x^3}{3},\ 11 + \frac{x^3}{3},\ 13 + \frac{x^3}{3},\ 15 + \frac{x^3}{3},\ 17 + \frac{x^3}{3},\ 19 + \frac{x^3}{3}\right\}$$

In[41]:=
```
Plot[Evaluate[tab], {x, -2, 2}, PlotRange → All, PlotStyle → Thick]
```

Out[41]=




DSolve::dvnoarg : The function y appears with no arguments. ≫