■ Find the solutions of $\left(\frac{dy}{dx}\right)^2 + y = x^2$ with intial value y(0) = 0

NDSolve[{ (y'[x]) ^2 + y[x] == x^2, y[0] == 0}, y, {x, -10, 10}]

Out[0]=

 $\Big\{ \Big\{ \textbf{y} \rightarrow \textbf{InterpolatingFunction} \, \Big[$

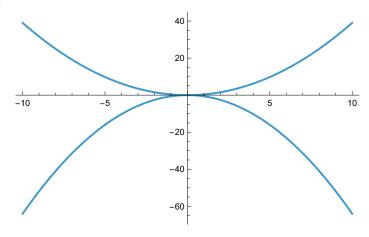
Domain: {{-10., 10.}}
Output: scalar

 $\Big\{ \mathbf{y} \to \mathbf{InterpolatingFunction} \Big[$

Domain: {{-10., 10.}} }
Output: scalar

in[*]:= Plot[y[x] /. %, {x, -10, 10}]

Out[0]=



```
In(*):= sol = NDSolve[{(y'[x])^2 + y[x] == x^2, y[0] == 0},
       y, \{x, -10, 10\}];
```

Table[{x, y[x] /. sol[1]]}, {x, -10, 10, 1}] // TableForm

Out[•]//TableForm= 39.0388 -10 31.6214 -9

> -8 24.9848

-7 19.129

14.054 -6

-5 9.75971

-4 **6.24621**

-3 3.51349

-2 1.56155

-1 0.390388

0. 0

-0.6403881

2 -2.56155

3 -5.76349

-10.24624

5 -16.0097

-23.0546

-31.3797

-40.98488

-51.87149

-64.038810

In[*]:= Grid[Table[{x, y[x] /. sol[1]}}, {x, -10, 10, 1}], Frame \rightarrow All]

-10	39.0388
-9	31.6214
-8	24.9848
-7	19.129
-6	14.054
-5	9.75971
-4	6.24621
- 3	3.51349
-2	1.56155
-1	0.390388
0	0.
1	-0.640388
2	-2.56155
3	-5.76349
4	-10.2462
5	-16.0097
6	-23.054
7	-31.379
8	-40.9848
9	-51.8714
10	-64.0388

```
In(*):= sol = NDSolve[{(y'[x])^2 + y[x] == x^2, y[0] == 0},
       y, \{x, -10, 10\}];
   Table[{x, Abs[y[x] /. sol[1]]]},
      {x, -10, 10, 1}] // TableForm
Out[]//TableForm=
           39.0388
   -10
   -9
           31.6214
           24.9848
   -8
   -7
           19.129
        14.054
   -6
   -5 9.75971
   -4 6.24621
   -3
          3.51349
   -2
          1.56155
   -1
           0.390388
           0.
   0
           0.640388
   1
   2
           2.56155
   3
           5.76349
           10.2462
   4
   5
           16.0097
           23.054
   6
           31.379
   7
           40.9848
   8
```

51.8714

64.0388

9

10