```
Needs["ODE'"]
```

```
To get more information type ?ODE
```

```
ODE[{y' == x^2 + y^2, y[1] == 1}, y, x, GraphLabel → Automatic,
 PlotSolution → {{x, 0.5, 1.5}, PlotStyle → {Thickness[0.01]}}]
```

$$\left\{\left\{y \to -\left(x^2\,\text{BesselJ}\left[-\frac{5}{4},\frac{x^2}{2}\right]\left(\text{BesselJ}\left[-\frac{3}{4},\frac{1}{2}\right]+\text{BesselJ}\left[\frac{1}{4},\frac{1}{2}\right]\right)+ x^2\,\text{BesselJ}\left[-\frac{3}{4},\frac{x^2}{2}\right]\left(-\text{BesselJ}\left[-\frac{5}{4},\frac{1}{2}\right]-3\,\text{BesselJ}\left[-\frac{1}{4},\frac{1}{2}\right]+\text{BesselJ}\left[\frac{3}{4},\frac{1}{2}\right]\right)+ \left(\text{BesselJ}\left[-\frac{3}{4},\frac{1}{2}\right]+\text{BesselJ}\left[\frac{1}{4},\frac{1}{2}\right]\right)\left(\text{BesselJ}\left[-\frac{1}{4},\frac{x^2}{2}\right]-x^2\,\text{BesselJ}\left[\frac{3}{4},\frac{x^2}{2}\right]\right)\right)\Big/ \left(x\left(2\,\text{BesselJ}\left[-\frac{1}{4},\frac{x^2}{2}\right]\left(\text{BesselJ}\left[-\frac{3}{4},\frac{1}{2}\right]+\text{BesselJ}\left[\frac{1}{4},\frac{1}{2}\right]\right)+ \text{BesselJ}\left[\frac{1}{4},\frac{x^2}{2}\right]\left(-\text{BesselJ}\left[-\frac{5}{4},\frac{1}{2}\right]-3\,\text{BesselJ}\left[-\frac{1}{4},\frac{1}{2}\right]+\text{BesselJ}\left[\frac{3}{4},\frac{1}{2}\right]\right)\right)\right)\right)\right\}\right\}$$

```
Table[ODE[{y'[x] == x^2 + y[x]^2, y[1] == 1}, y[x],
  x, Method → Picard, Iterations → n, GraphLabel -> Automatic,
    PlotSolution -> {{x, 0.5, 1.5}}], {n, 0, 3}]
```

$$\{\{y[x] \to 1\}\},$$

$$\left\{\left\{y[x] \to -\frac{1}{3}+x+\frac{x^3}{3}\right\}\right\},$$

$$\left\{\left\{y[x] \to \frac{97}{210}+\frac{x}{9}-\frac{x^2}{3}+\frac{2\,x^3}{3}-\frac{x^4}{18}+\frac{2\,x^5}{15}+\frac{x^7}{63}\right\}\right\},$$

$$\left\{\left\{y[x] \to \frac{14736703}{48648600}+\frac{9409\,x}{44100}+\frac{97\,x^2}{1890}+\frac{1997\,x^3}{8505}+\frac{128\,x^4}{945}+\frac{131\,x^5}{3150}-\frac{4729\,x^6}{85050}+ \frac{23\,x^7}{315}-\frac{109\,x^8}{5880}+\frac{697\,x^9}{34020}-\frac{4\,x^{10}}{1575}+\frac{184\,x^{11}}{51975}-\frac{x^{12}}{6804}+\frac{4\,x^{13}}{12285}+\frac{x^{15}}{59535}\right\}\right\}$$

```
Do[
  Show[Graph[i], Graph[12]], {i, 17, 20}]
```