Venn Diagrams

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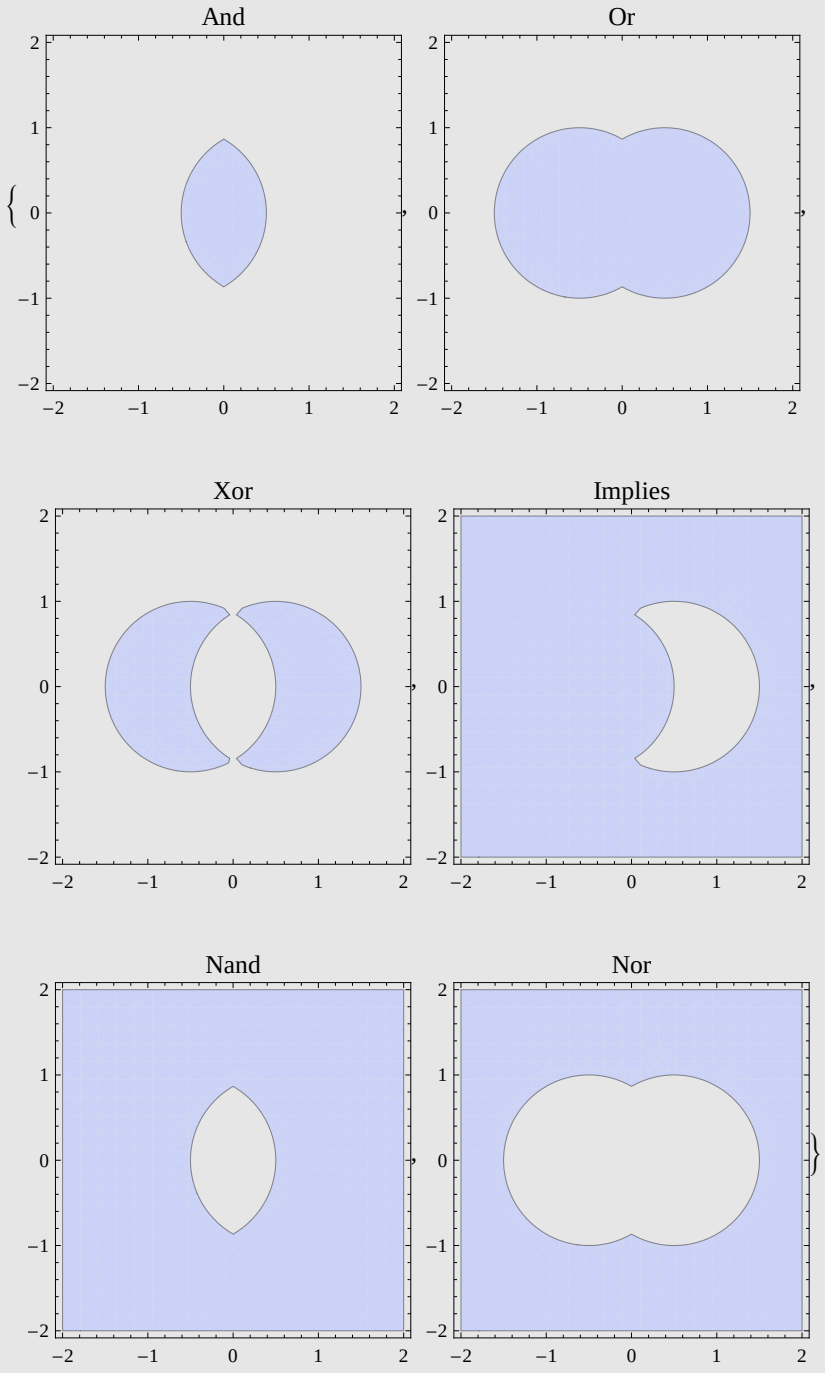
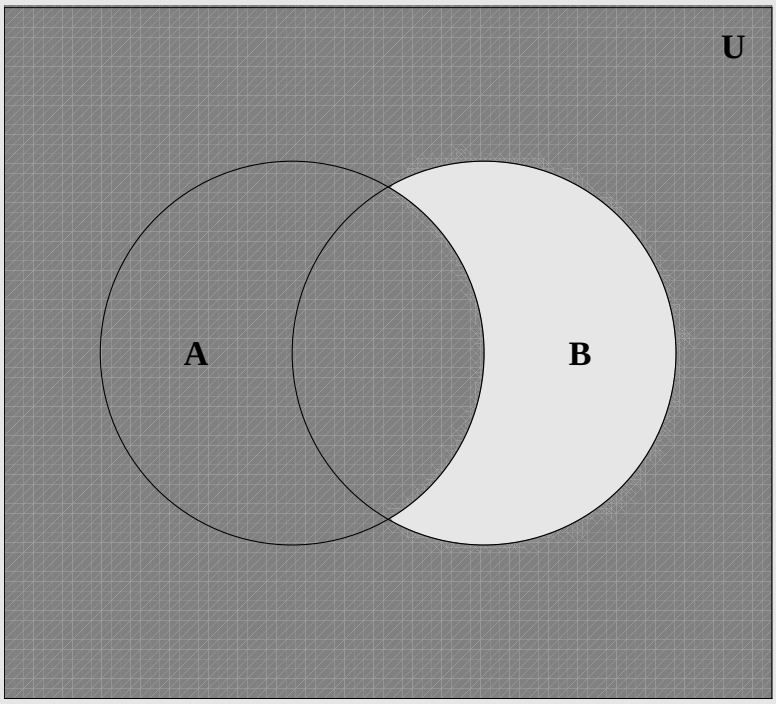
Two Sets

```
a = (-1/2 + x)^2 + y^2 < 1;
b = (1/2 + x)^2 + y^2 < 1;
Table[RegionPlot[f[a, b], {x, -2, 2}, {y, -2, 2}, PlotLabel → f],
 {f, {And, Or, Xor, Implies, Nand, Nor}}]
```


And
Or
Xor
Implies
Nand
Nor

```
RegionPlot[Implies[a, b], {x, -2, 2}, {y, -2, 2}, FrameTicks → None,
 Frame → True, PlotStyle → Gray, BaseStyle → {Bold, 16},
 Frame → False, PlotPoints → 80, PlotRange → {{-2, 2}, {-1.8, 1.8}},
 AspectRatio → Automatic, Epilog → {Text["U", {1.8, 1.6}], Text["A", {-1, 0}],
   Text["B", {1, 0}], Circle[{1 / 2, 0}, 1], Circle[{-1 / 2, 0}, 1]}]
```



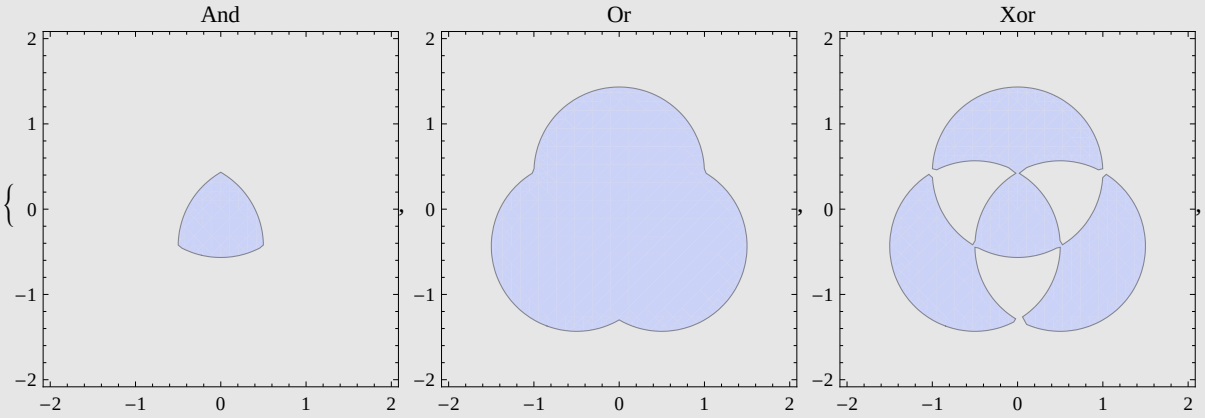
Three Sets

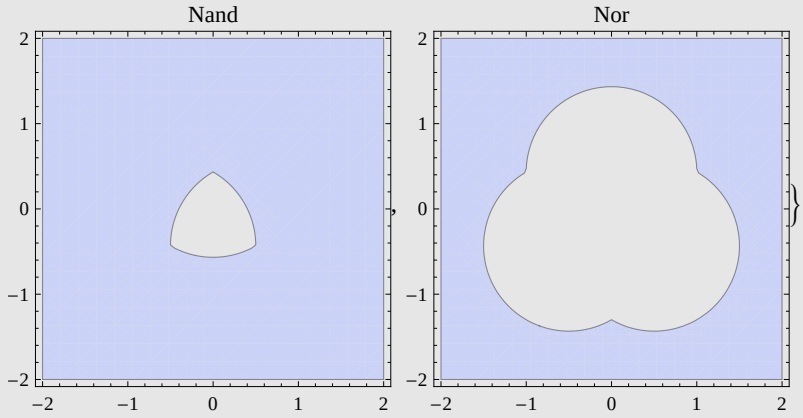
$$a = \left(x - \frac{1}{2}\right)^2 + \left(y + \frac{\sqrt{3}}{4}\right)^2 < 1;$$

$$b = \left(x + \frac{1}{2}\right)^2 + \left(y + \frac{\sqrt{3}}{4}\right)^2 < 1;$$

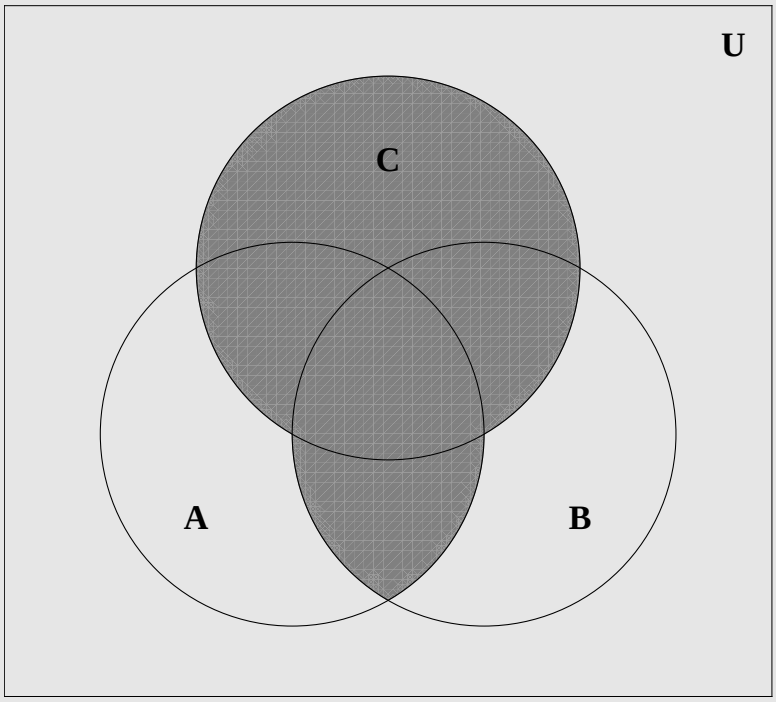
$$c = x^2 + \left(y - \frac{\sqrt{3}}{4}\right)^2 < 1;$$

```
Table[RegionPlot[f[a, b, c], {x, -2, 2}, {y, -2, 2}, PlotLabel -> f],
  {f, {And, Or, Xor, Nand, Nor}}]
```

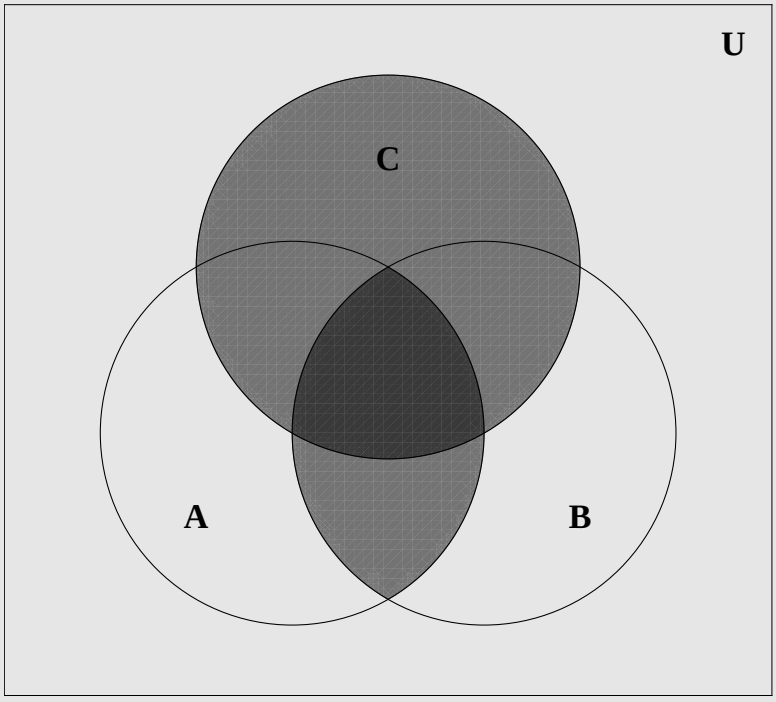




```
RegionPlot[Or[And[a, b], c], {x, -2, 2}, {y, -2, 2}, FrameTicks → None,
 Frame → True, PlotStyle → Gray, BaseStyle → {Bold, 16}, Frame → False,
 PlotPoints → 80, PlotRange → {{-2, 2}, {-1.8, 1.8}}, AspectRatio → Automatic,
 Epilog → {Text["U", {1.8, 1.6}], Text["A", {-1, -Sqrt[3] / 2}],
   Text["B", {1, -Sqrt[3] / 2}], Text["C", {0, 1}], Circle[{1 / 2, -Sqrt[3] / 4}, 1],
   Circle[{-1 / 2, -Sqrt[3] / 4}, 1], Circle[{0, Sqrt[3] / 4}, 1]}]
```



```
p1 = RegionPlot[And[a, b], {x, -2, 2}, {y, -2, 2}, FrameTicks → None, Frame → True,
    PlotStyle → {Opacity[.5], Black}, BaseStyle → {Bold, 16}, Frame → False,
    PlotPoints → 80, PlotRange → {{-2, 2}, {-1.8, 1.8}}, AspectRatio → Automatic,
    Epilog → {Text["U", {1.8, 1.6}], Text["A", {-1, -Sqrt[3] / 2}], Text["B",
        {1, -Sqrt[3] / 2}], Text["C", {0, 1}], Circle[{1 / 2, -Sqrt[3] / 4}, 1],
      Circle[{-1 / 2, -Sqrt[3] / 4}, 1], Circle[{0, Sqrt[3] / 4}, 1]}];
p2 = RegionPlot[c, {x, -2, 2}, {y, -2, 2}, FrameTicks → None, Frame → True,
    PlotStyle → {Opacity[.5], Black}, BaseStyle → {Bold, 16}, Frame → False,
    PlotPoints → 80, PlotRange → {{-2, 2}, {-1.8, 1.8}}, AspectRatio → Automatic,
    Epilog → {Text["U", {1.8, 1.6}], Text["A", {-1, -Sqrt[3] / 2}], Text["B",
        {1, -Sqrt[3] / 2}], Text["C", {0, 1}], Circle[{1 / 2, -Sqrt[3] / 4}, 1],
      Circle[{-1 / 2, -Sqrt[3] / 4}, 1], Circle[{0, Sqrt[3] / 4}, 1]}];
Show[
 p1,
 p2]
```



Reference

Adapted from help topic ‘ref/RegionPlot’