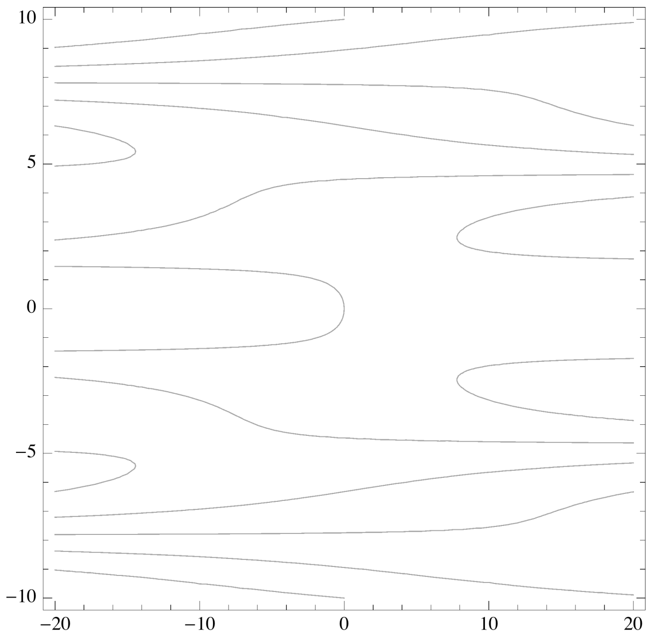
We start by defining the Hamiltonian for this problem:

```
h[x_, y_] = x Cos[y] + y^2
```

$y^2 + x \operatorname{Cos}[y]$

Here's the default contour plot we get using ContourPlot:

```
ContourPlot[h[x, y], {x, -20, 20}, {y, -10, 10},
 ContourShading → False]
```



To see the level curves with saddle points, we'll need to carefully pick the level curve/contour values. We have found equilibrium points including $(\pi, \pi/2)$ and $(-3\pi, 3\pi/2)$. Let's evaluate the Hamiltonian at each of these to find the corresponding level curve values

```
h[Pi, Pi / 2]
```

$\frac{\pi^2}{4}$

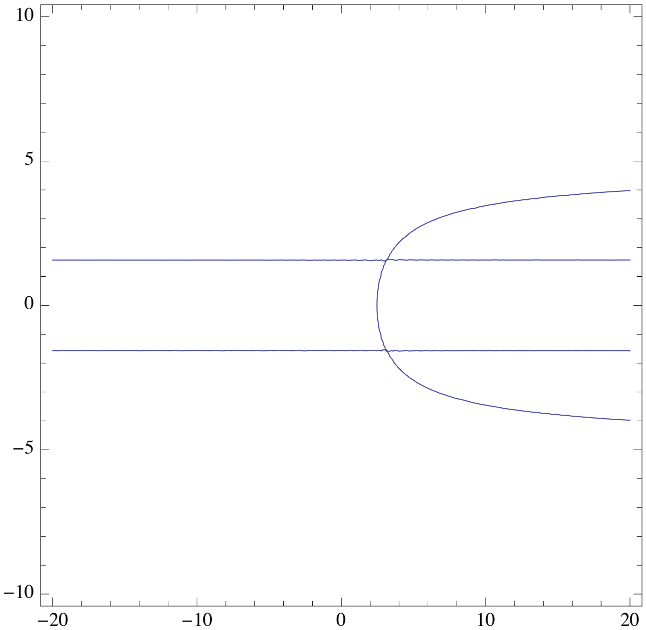
```
h[-3 Pi, 3 Pi / 2]
```

$\frac{9\pi^2}{4}$

These are multiples of $\pi^2/4$. We'll use this fact in choosing level curve values in our contour plot.

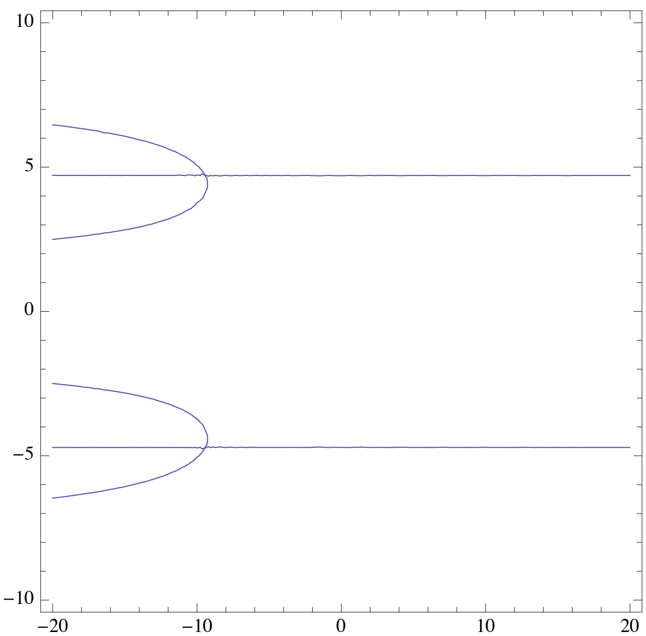
There are two ways we can specify level curve values in the **ContourPlot** command. Here's one way:

```
ContourPlot[h[x, y] == h[Pi, Pi / 2], {x, -20, 20}, {y, -10, 10},
 ContourShading → False]
```



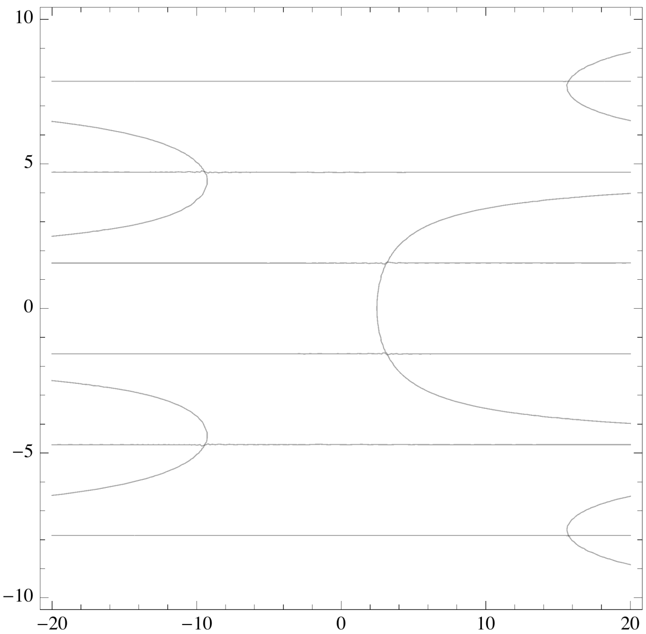
Same style but different level curve/contour value for the other equilibrium point we examined:

```
ContourPlot[h[x, y] == h[-3 Pi, 3 Pi / 2], {x, -20, 20}, {y, -10, 10},
 ContourShading → False]
```



This method is limited to one level curve/contour value. To show more than one level curve/contour value, we can use the **Contours** option. Here's an example:

```
ContourPlot[x Cos[y] + y^2, {x, -20, 20}, {y, -10, 10},
 Contours → {Pi^2 / 4, 9 * Pi^2 / 4, 25 Pi^2 / 4},
 ContourShading → False]
```



Note that you can put the cursor on a level curve in any of these plots to see the corresponding level curve value.

We can use a **Table** command to generate a larger list of level curve/contour values.

```
ContourPlot[x Cos[y] + y^2, {x, -20, 20}, {y, -10, 10},
 Contours → Table[n Pi^2 / 4, {n, 0, 50}],
 ContourShading → False]
```