Problem:

Solve the system of equations:

$$\begin{cases}\sqrt{3x-5}=\sqrt{3y+7}\\ y^2+x=10\end{cases}$$

Solution:

$$\begin{cases}\sqrt{3x-5}=\sqrt{3y+7}\\ y^2+x=10\end{cases}\Rightarrow\begin{cases}x=10-y^2\\ \sqrt{3(10-y^2)-5}=\sqrt{3y+7}\end{cases}\Rightarrow$$

$\Rightarrow$ let's square the 2nd equation, and in order not to add new roots, let's write the condition $3y+7\geq 0$.

$$\Rightarrow\begin{cases}30-3y^2-5=3y+7\\ 3y+7\geq 0\end{cases}\Rightarrow\begin{cases}y^2+y-6=0\\ 3y+7\geq 0\end{cases}\Rightarrow y=\frac{-1\pm 5}{2},\text{ при } y=\frac{-1-5}{2}=-3\Rightarrow 3y+7=-2<0$$

$$\Rightarrow\ this\ root\ doesn't\ satisfy\Rightarrow\ y=\frac{-1+5}{2}=2,\qquad 3y+7>0,\qquad x=10-y^2=10-4=6.$$

Answer: $x=6, y=2$.