C. analysis by $\frac{d^2y}{dx^2}$.

$\frac{d^2y}{dx^2} = -\cos y$, $-2\pi < y < 2\pi$

as we all know, $y = \frac{\pi}{2}$ is stability

when $y = \frac{\pi}{2}$, $\frac{d^2y}{dx^2} = 0$ the situation can't conclusion

$\frac{dy}{dx} = 1$ when y increases, the $\frac{dy}{dx}$ decreases

when y decreases, then $\frac{dy}{dx}$ increases

so, the equation in twoside of $y = \frac{\pi}{2}$ present the trend of near 0, so, It's stability