\[
\begin{align*}
\frac{dx}{dt} &= 8 \sin x + 2y \\
\frac{dy}{dt} &= -2x - 8y \cos x
\end{align*}
\]

1. Find the equilibrium points of this system.

2. Calculate the Jacobean matrix at each equilibrium point.

3. Find the linear approximation to this system at each equilibrium point.

4. Sketch what you think the phase plane should look like around each equilibrium point. Do not use Maple for this.

5. Is this system Hamiltonian?

6. If it is Hamiltonian, find the Hamiltonian function, and plot some of its level curves. If it is not Hamiltonian, how do you know it’s not?