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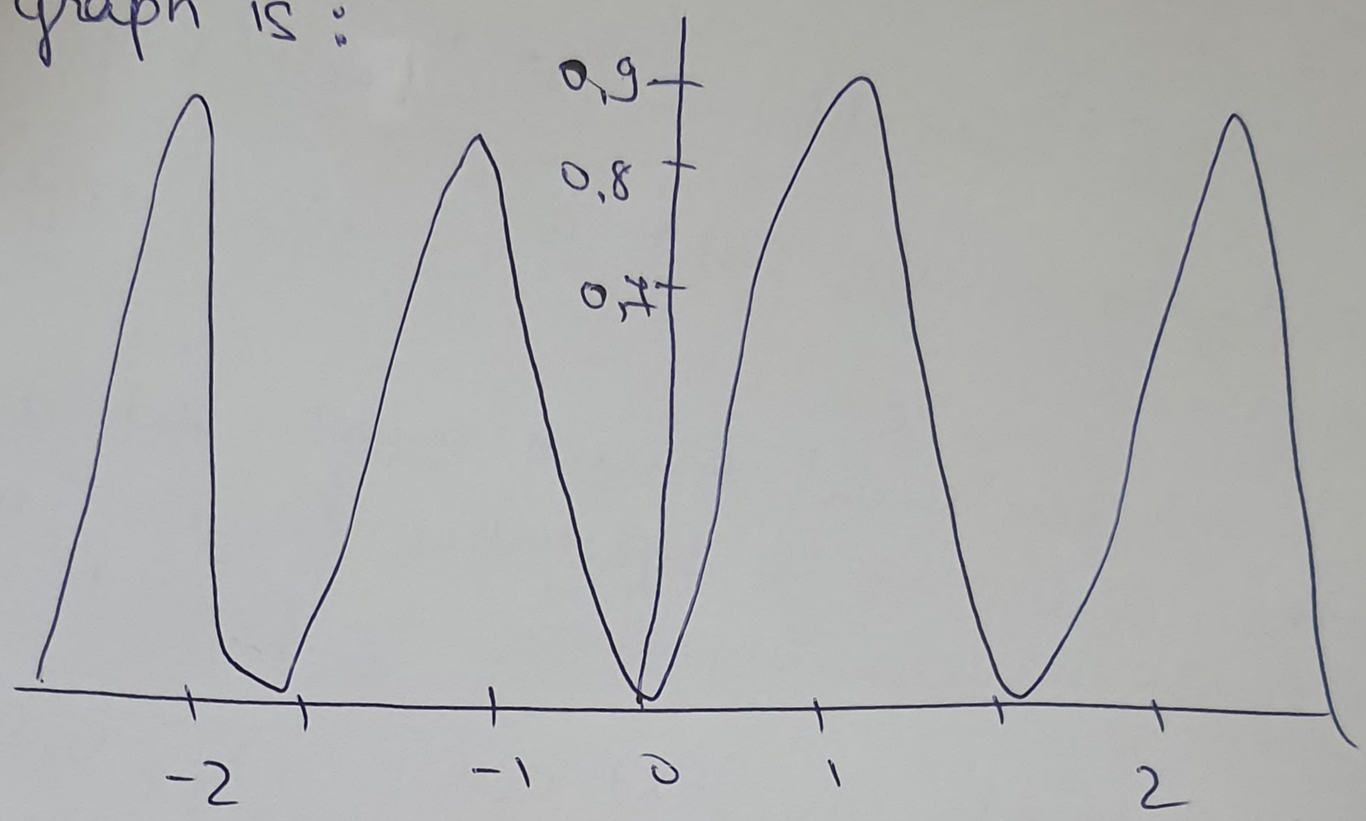
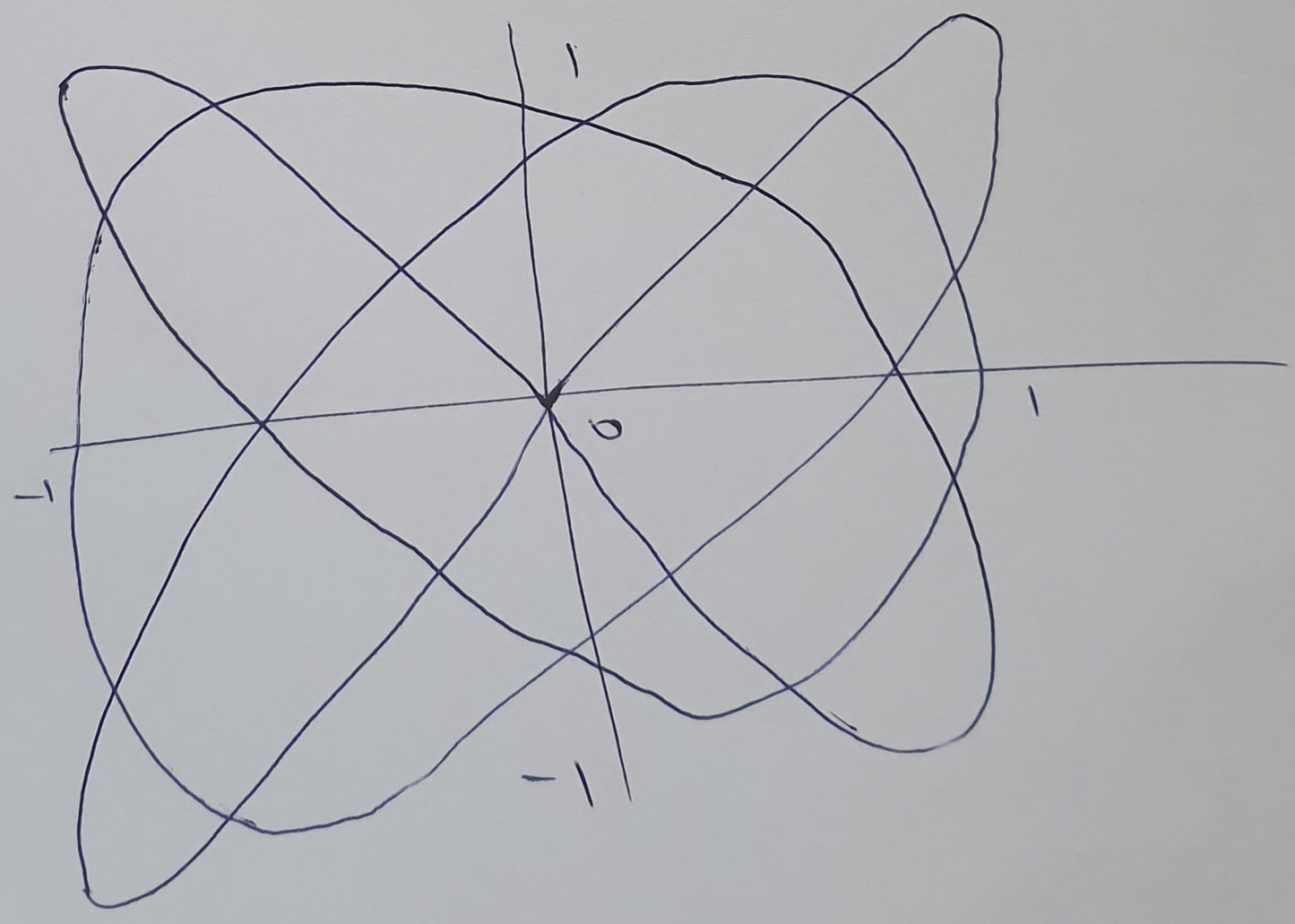
## Lab test

1. The solution of the ivp is $u(t) = \frac{1}{2} - \frac{\cos(4t)}{2}$

The graph is:




2. a) The planar curve is:




1. The approximate value of the solution is

$\frac{1}{2} - \frac{e^{4it}}{4} - \frac{e^{-4it}}{4}$

3. $A = \begin{pmatrix} -1 & -7 \\ 7 & -1 \end{pmatrix}$

$\det(A) = 50$

The eigenvalues of A are $-1+7i, -1-7i$

$$e^{tA} = \begin{pmatrix} +e^{-t}\cos(7t) & -e^{-t}\sin(7t) \\ e^{-t}\sin(7t) & e^{-t}\cos(7t) \end{pmatrix}$$

The equilibrium point is a focus and a global attractor.

4. (0,0) is not an unique equilibrium point, but it is also not hyperbolic (the real part of eigenvalue 0 is 0, ~~which~~ which means we don't have a hyperbolic eq. point).

5. The fixed points of $f(x)$ are 0,5, -0,5 and 0. The sequence of iterations starting with 0, 12 and -11 are all constant, meaning they are all convergent in the same fixed point.

2. b) yes.