

A separable equation,





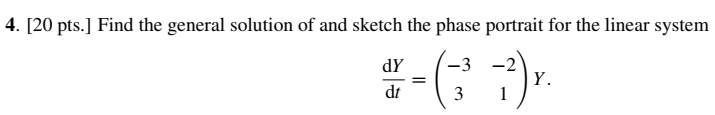
Multiply by  and integrate





A homogeneous equation. The substitution . It follows than  and





The characteristic equation



has roots . It follows that

.

The equalities



imply

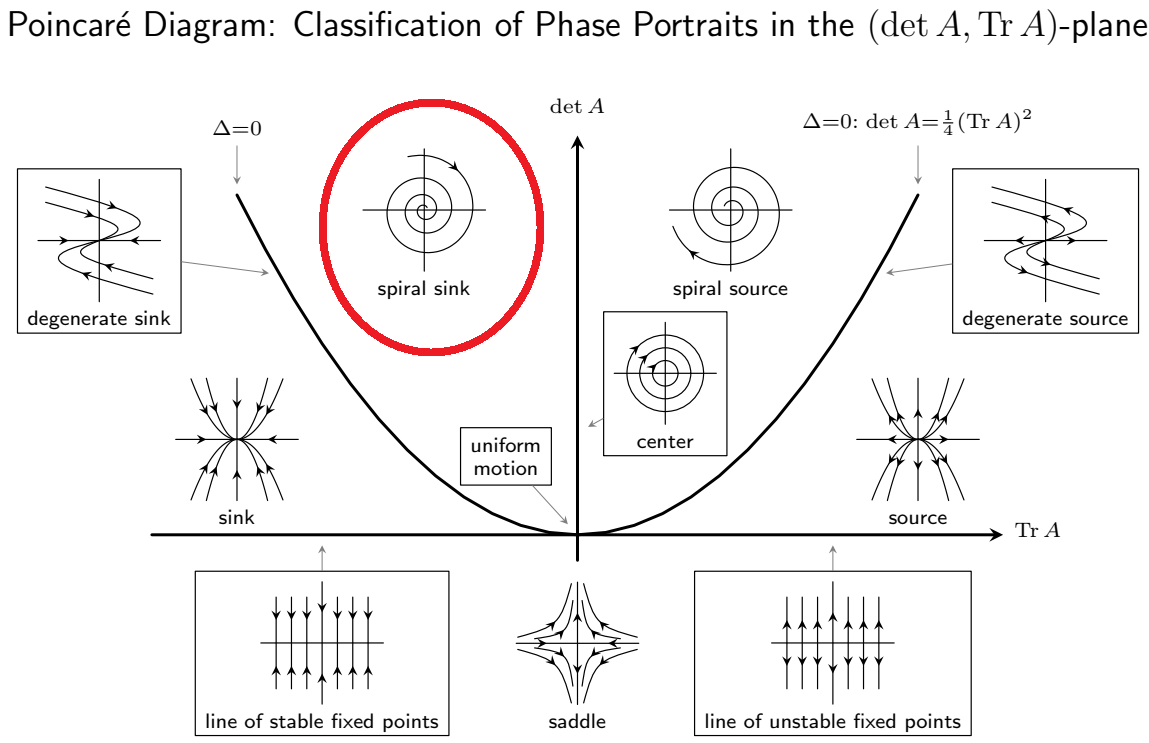


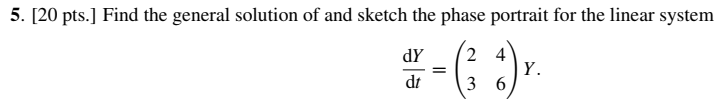
It follows that the general solution is

,

where  is an arbitrary vector.

Since  and  , the phase portrait is a spiral sink.



 The characteristic equation



has roots , . It follows that

.

The equalities



imply

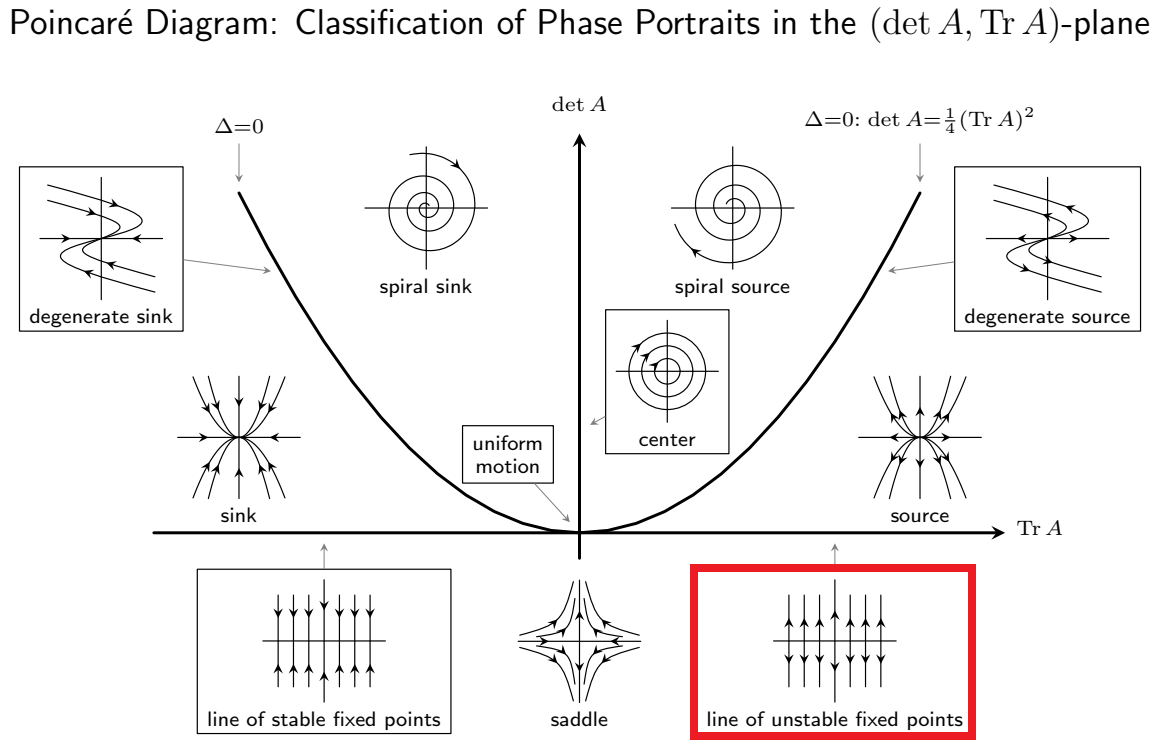


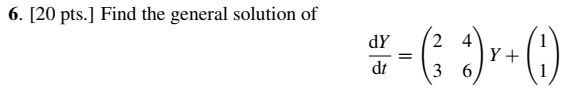
It follows that the general solution is

,

where  are arbitrary reals.

Since  and  , the phase portrait is a line of unstable fixed points.





The general solution of the inhomogeneous equation is

,

where  is a particular solution. Let

.

It follows that

.

We have  and . The last equation is solvable iff  or . So, we get . We can choose , so

.



The auxiliary equation of the homogeneous equation is . It follows that the general solution of the homogeneous equation is . A particular solution of the inhomogeneous equation we find as

.

We have



and

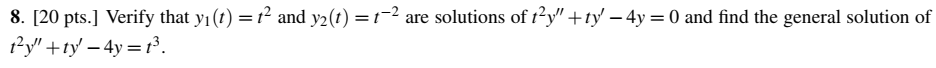


It follows that , , , and



So we have

.



Let us verify



Let . We have

.

It follows that  and .



The Laplace transform

.

It follows that  and

.



The Taylor series

 .

So,



It follows that  and  and the first 5 terms are

