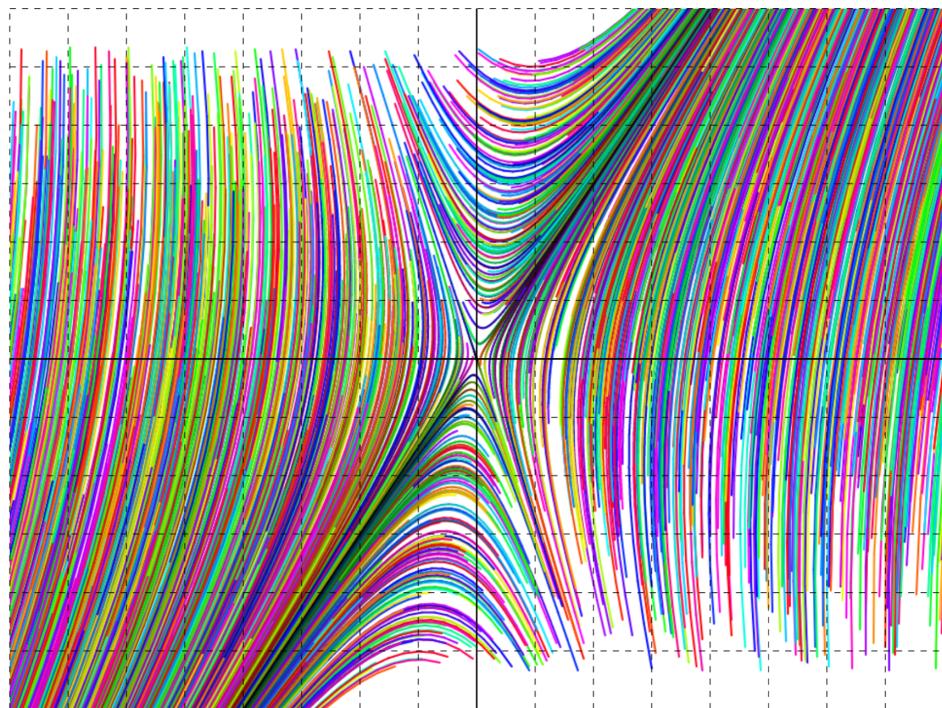


MATH 114 Final Exam Question 6

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6. Consider the following diagram, which is generated by a matrix M :

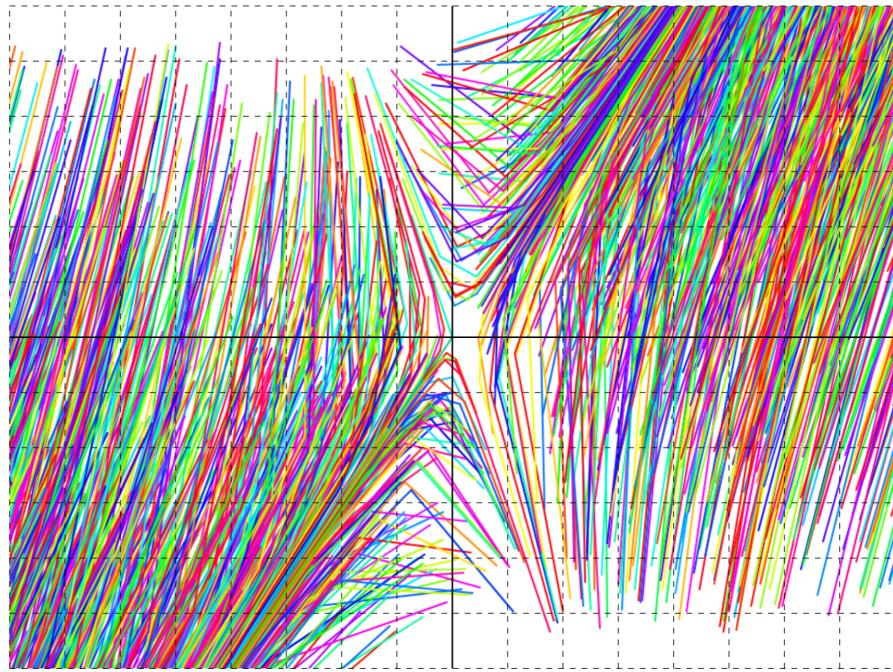


- (a) What can you say about M ? Include as much detail as you can.

M has two eigenvalues, with their associated eigenvectors lying on the “asymptotes” in the image. This comes from the fact that M ’s eigenvectors will only be scaled up or down in its transformation. This corresponds to straight lines on the image.

$\det(M) > 1$, since all of the vectors transform away from the origin.

(b) Consider the following diagram, which is generated by a matrix N :



M and N are similar. What is the same about M and N ? What is different about M and N ?

M and N both share the same characteristics as I mentioned above. However, the lines created by N are much more jagged than those created by M . This means that N transforms vectors more than M does. In mathematical terms, this means that $\det(N) > \det(M)$. In fact, N is likely a scalar multiple of M .