

Mathematics 1350H – Linear algebra I: matrix algebra
TRENT UNIVERSITY, Fall 2008

Assignment #3

Due on Friday, 7 November, 2008.

A quadratic equation

1. Find all the matrices $\mathbf{X} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ satisfying the equation $\mathbf{X}^2 - 2\mathbf{X} + \mathbf{I}_2 = \mathbf{0}$. [10]

Note: $\mathbf{I}_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ satisfies the equation, but it's not the only one that does. For example, $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ does so too.

Nikolai Ivanovich Lobachevsky

Who made me what I am today:
the mathematician that others all quote?
Who is the one who made me that way?
The greatest that ever got chalk on his coat!

One man deserves the credit, One man deserves the blame,
And Nikolai Ivanovich Lobachevsky is his name, Hey!
Nikolai Ivanovich Lobach ...

I am never forget the day I first meet great Lobachevsky;
In one word, he tells me secret to success in mathematics:
Plagiarize!!

Plagiarize!! Let no one else's work evade your eyes!
Remember why the good Lord made your eyes,
So don't shade your eyes,
But plagiarize, plagiarize, plagiarize!!
(Only remember always to call it, please, "research".)

And ever since I meet this man, my life is not the same,
And Nikolai Ivanovich Lobachevsky is his name,
Hey! Nikolai Ivanovich Lobach ...

I am never forget the day I am given first original paper to write.
It was on algebraic and analytic topology of locally euclidean metrization
Of infinitely differentiable Riemannian manifolds.
Bozhe moi!!

This, I know, from nothing.
But I think of great Lobachevsky and I get idea; hah *hah*!!

I have a friend in Minsk
Who has a friend in Pinsk
With friend in Omsk, with friend in Tomsk
With friend in Akhmolinsk.
His friend in Alexandrovsk
Has friend in Petropavlovsk
Whose friend somehow is solving now
The problem in Dnepropetrovsk.

And when his work is done,
Hee hee!! Begins the fun.
From Dnepropetrovsk to Alexandrovsk
By way of Ysessisk and Novorossisk,
To Omsk, to Tomsk, to Minsk to Pinsk,
To *me*, the news will run,
Yes, to *me* the news will run...
And *then* I write, by morning, night,
And afternoon, and pretty soon
In Dnepropetrovsk, my name is cursed
When he finds out, I published first!!
And who deserves the credit? And who deserves the blame?
Nikolai Ivanovich Lobachevsky is his name, Hey!
Nikolai Ivanovich Lobach . . .
I am never forget the day my first book is published.
Every chapter I steal from somewhere else.
Index I copy from old Vladivostok telephone directory.
This book! This book was sensational!
Pravda – Well, Pravda said [insert nonsense in Russian] – It stinks!!
But Izvestia!! Izvestia said [insert more nonsense in Russian] – It stinks!!
Metro Goldwyn Moskva buys film rights for 40 million rubles,
And changes name to *The Eternal Triangle*
With Doris Day playing part hypotenuse!
[Chorus, this time actually finishing.]

Tom Lehrer