Math 152, Linear Systems
Spring 2018

Description: Math 152, Linear Systems, is a first course in linear algebra. It emphasizes geometry in two and three dimensions, applications to engineering and science problems, and practical computations using Matlab.

Web site: `www.math.ubc.ca/~karu/m152`. The website includes useful links to the textbook, Connect page, old exams, etc.

Textbook: We will use online lecture notes specifically written for this course. The course web page has a link to the notes.

Webwork. There will be weekly homework problems using the online Webwork system. Assignments are posted on the Connect page and they are due on Mondays 10PM. Late assignments will not be accepted, but the lowest score of the 11 assignments will be dropped from the final grade.

Computer Labs. Everyone should be registered for a computer lab section. There are 6 one hour labs to complete, one every two weeks. Lab reports are due on Fridays 10PM during the week of the lab. Note that different lab sections have labs on different weeks and therefore different due dates. All 6 labs count towards your final grade. Material from the included in the exams.

Exams. There will be two evening midterm exams, on February 8 and March 15, 6-7PM. The $2\frac{1}{2}$ hour final exam will be scheduled by the university. No electronic aids (calculators, cell phones, etc.), notes or books are allowed during the exams.

Evaluation. Your final grade will be based on your performance on Webwork (10%), computer labs (10%), midterm exams (15% each) and final exam (50%).

List of topics covered.

- week #1 January 3-5: vectors and coordinate representation; vector length. Notes sections 2.1, 2.2, 2.3

- week #2 January 8-12: dot product, projection; determinants; cross product; lines in 2D and 3D, planes in 3D. 2.3, 2.4, 2.5

- week #3 January 15-19: lines and planes (continued); geometry of solutions of linear systems; linear dependence and independence; 2.5, 2.6

- week #4 January 22-26: solving linear systems; echelon form, reduced row echelon form, rank; homogeneous equations. 3.1, 3.2, 3.3

- week #5 January 29 - February 2: homogeneous systems (continued); geometric applications; resistor networks. 3.3, 3.4, 3.5

- week #6 February 5-9: Midterm #1; matrix multiplication; linear transformations. 4.1, 4.2

- week #7 February 12-16: (Monday holiday) rotations, projections and reflections in 2D; matrix representation and composition of linear transformations; random walks. 4.2, 4.3, 4.4

- Spring Break: February 19-23

- week #8 February 26-March 2: random walks (continued); transpose; matrix inverse; determinants. 4.3, 4.4, 4.5, 4.6

- week #9 March 5-9: determinants (cont.); complex numbers; complex exponential and polar form; 4.6, 5.1, 5.2, 5.3, 5.4

- week #10 March 12-16: Midterm #2; eigenvalues and eigenvectors 6.1

- week #11 March 19-23: eigenvalues and eigenvectors (cont.); powers of a matrix; application of eigen-analysis to random walks. 6.1, 6.2

- week #12 March 26-30: (No Friday class) vector differential equations; application of vector DEs to electrical networks. 6.3, 6.4

- week #13 April 2-6: complete course material; review.