

Detailed list of review topics for Math 226, midterm 1.

This is a rough list of the things you should definitely be able to do. I think the best way to use this review sheet is to try to recall or come up with an example for each concept or technique listed below. Then try to solve that example, and if you cannot (or could not come up with one to begin with), then re-read the corresponding section in the book. It is very important to try to think of all these concepts without opening the book, at first. Copies of this review sheet will not be allowed at the exam. Good luck!

1. VECTORS, AND EQUATIONS OF LINES AND PLANES

- Two ways to write a vector: $\langle a, b, c \rangle = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$.
- Basic operations with vectors: addition, subtraction, scalar multiplication.
- Finding a unit vector parallel to a given vector \mathbf{a} : $\mathbf{u} = \frac{\mathbf{a}}{|\mathbf{a}|}$.
- Dot product and cross product of vectors.
- Using dot product to find angles between vectors; finding area of a parallelogram in \mathbb{R}^n .
- a component of \mathbf{a} along \mathbf{b} . Vector projection of \mathbf{a} onto \mathbf{b} .
- scalar triple product of vectors; volume of a box.
- parametric and symmetric forms of the equation of a line in space (how to write an equation of the line that contains two given points). How to determine whether two lines in space intersect.
- Equations of planes: normal vector; how to write an equation of the plane through three given points.
- Finding distances: between two points, from a point to a plane, from a point to a line, between lines.
- How to find symmetric and parametric equations for the line of intersection of two planes.
- Finding angles: between two planes, between a line and a plane, between lines.

2. OPEN AND CLOSED SUBSETS OF \mathbb{R}^n ; FUNCTIONS

- Definitions of an open and closed set
- Interior, exterior, boundary points
- Domain and range of a function of several variables.
- Contour maps (level curves of a function and their meaning).