

Math 10A

Midterm 1

Review

Prof. Janet Vassilev

January 24, 2007

1. Know how to find the equation of a line (preferably parametric equations):
 - (a) Containing two points.
 - (b) Containing a point and generated by a vector.
 - (c) Perpendicular to a plane.
2. Know how to find expressions representing planes:
 - (a) The set of points of the form $sv_1 + tv_2$ where s and t are real numbers and v_1 and v_2 are vectors.
 - (b) The equation of a plane containing three points.
 - (c) The equation of a plane containing a point and perpendicular to a line.
 - (d) The equation of a plane containing two parallel lines.
 - (e) The equation of a plane spanned by two vectors.
3. Computations in \mathbb{R}^n .
 - (a) Find the dot product of any two vectors.
 - (b) Find the length of a vector.
 - (c) Find the projection of a vector onto another vector.
 - (d) Find the angle between two vectors.
 - (e) Verify Cauchy-Schwarz Inequality or Triangle Inequality for any two vectors.
4. Cylindrical and Spherical Coordinates.
 - (a) Conversion between Cartesian, Cylindrical and Spherical Coordinates.
 - (b) Describe the set of points when one of the variables is constant in any of the coordinate systems.

5. Computations in \mathbb{R}^3 .

- (a) Find the cross product between two vectors.
- (b) Find the area of a parallelogram.
- (c) Find the distance from a point to a plane.
- (d) Find the intersection of two planes (if any).
- (e) Find the intersection of a line and a plane (if any).
- (f) Find the intersection of two lines (if any).

6. Matrices.

- (a) Find the sum of any two $n \times m$ matrices.
- (b) Find the product of a $n \times m$ matrix and a $m \times k$ matrix.
- (c) Find the determinant of a 2×2 , 3×3 matrix or an $n \times n$ matrix for $n \geq 4$ with ample 0's.
- (d) Know the determinant rules $|AB| = |A||B|$ and $|kA| = k^n|A|$.

7. Vector valued functions:

- (a) Find the domain of a vector valued function.
- (b) Find the range of a vector valued function.
- (c) Find and graph the level sets of a real valued function.