

Math 220 Review Sheet for Exam 1

Time and Place of Exam: Wednesday, October 16, 9:00–9:55 AM
MSB 311

Coverage: Text Sections 1.1–1.5, 2.1–2.3, 3.2–3.4,
4.1

Things to Bring to the Exam:

- Sharpened pencils and an eraser. *Please do not use a pen!*
- A calculator that does *not* perform symbolic calculations. (For instance, a TI-8*i* series calculator is ok if $i < 9$, but not a TI-89, TI-92 or HP-48.) *Warning:* The instructor may examine the memory registers of calculators at random. If there are any non-executable programs with formulas relevant to the course, the exam will end for the person with that calculator, and a grade of zero will be recorded.

Review Suggestions:

- * Try as many of the following as time allows: Review Exercises 1.9 (Exercises 1–2, 4–16, 18–23, pp. 77–78), Review Exercises 2.4 (Exercises 1–2, 5–11, pp.111–112), Review Exercise 3.5 (Exercises 3–4, 6–22, p. 146), and Review Exercises 4.11 (Exercises 1–2, p. 229) *without referring to notes or earlier parts of the chapters*. Doing them with other students will help you and them improve your mastery of the material.
- * Rework worksheets and quizzes to date, with books and notes closed. (Check the course Web site, where electronic versions will be posted.) Many items on those are questions from previous examinations.
- * Take advantage instructor regular and special office hours to clarify points you are not confident about.
- * For final pre-exam prep, download and print the practice exam and the 1999 Math 220 Exam 1 from the class Web site. (Ignore Question 6 from 1999, which concerns material from Section 4.3. That section is *not* included in this year's Exam 1.) Get together with your study group and work on them just as you would during the weekly discussion period: no books or notes!

Things to concentrate on:

- Section 1.1: How to perform basic algebraic operations on vectors in \mathbf{R}^2 and \mathbf{R}^3 ; how to find the vector \mathbf{PQ} from a point P to a point Q ; how to determine whether given vectors are parallel; how to find the unit vector in the direction of a given vector \mathbf{v} ; parallelogram law for vector addition and representation of vector difference $\mathbf{v} - \mathbf{w}$; distance formula in \mathbf{R}^3 ; equation of a sphere; standard basis and expression of a given vector in terms of standard basis vectors.
- Section 1.2: Dot product, angle between two vectors, condition for two vectors to be perpendicular; projection of a vector \mathbf{x} onto a vector \mathbf{v} , coordinate of \mathbf{x} in the direction of \mathbf{v} .

- Section 1.3: Vector and parametric scalar equations of a line in \mathbf{R}^3 ; how to determine them for a line through two given points; how to determine whether two given lines intersect, are parallel, perpendicular, or skew.
- Section 1.4: Normal-form equation of a plane; how to find point of intersection of a plane and a line (as in Exercise 15).
- Section 1.5: Definition of cross product (p. 41) and how to use it as in Examples 5.2–5.4 to find the equation of a plane; Theorem 5.8, Corollary 5.9.
- Sections 2.1, 2.2, 2.3: Definitions 1.1, 1.5, 1.10, 2.1, 2.5, 2.8, 3.1 and how to use them as in the examples and exercises of those sections; how to calculate curvature by means of Theorem 3.2, and how to find tangential and normal components of acceleration, unit normal and curvature by using (5), (6), and Definition 3.8 (pp. 107–108).
- Section 3.2: Definitions 2.1 and 2.4, Theorems 2.3, 2.5, 2.8 and 2.10.
- Sections 3.3–3.4: Basic sketching and recognition of graphs in \mathbf{R}^3 , Theorem 3.5 and how to use it to find equations of surfaces of revolution; how to determine and sketch level curves and and recognize plots of level surfaces; names of quadric surfaces and their corresponding equations.
- Section 4.1: How to find partial derivatives of scalar functions, the tangent plane and a normal vector to the graph of $z = f(x, y)$ at a given point; marginal values and their interpretation.