

Math Xb Spring 2004

Midterm 1 Review Guide

1 Topics

Midterm 1 will cover chapters 17 through 20 (omitting §18.3 and §20.7) in our textbook, *Calculus: An Integrated Approach to Functions and Their Rates of Change*. In particular, you will be responsible for the following topics.

CHAPTER 17: IMPLICIT DIFFERENTIATION AND ITS APPLICATIONS

- To use logarithmic differentiation to find the derivatives of functions of the form $f(x)^{g(x)}$
- To use implicit differentiation to find $\frac{dy}{dx}$ given an equation involving x and y
- To find the slope of a tangent line to a given curve (described by an equation involving x and y) at a given point
- To find the points on a curve (described by an equation involving x and y) at which the tangent line has a given slope
- To understand how to use a geometric relationship between two or more variables that depend on time to find a relationship between the rates of change of those variables

CHAPTER 18: GEOMETRIC SUMS AND SERIES

- To recognize a finite geometric sum and identify its common ratio
- To express a geometric sum in closed form
- To compute a numeric geometric sum
- To determine if a given geometric series converges or diverges
- To find the sum of a given convergent geometric series
- To express a geometric sum or series using summation notation
- To analyze a geometric sum or series expressed in summation notation
- To be able to use geometric sums and series to solve problems in a variety of contexts

CHAPTERS 19 & 20: TRIGONOMETRY

- To understand sine and cosine as functions of arc length on the unit circle
- To approximate sine, cosine, and tangent values given a calibrated unit circle
- To be familiar with the graphs of the sine, cosine, and tangent functions
- To understand the periodicity of the sine and cosine functions
- To identify the balance value, amplitude, and period of a sinusoidal function given its formula or graph
- To use trig functions to model other functions
- To understand the interpretation of $\tan x$ as the slope of a certain line.

- To understand the relationship between angles and arc length.
- To take advantage of circle symmetry when finding trig function values.
- To understand the relationship between sine, cosine, and tangent and right triangles.
- To know the sine, cosine, and tangent values of $\frac{\pi}{6}$, $\frac{\pi}{4}$, and $\frac{\pi}{3}$.
- To “solve” triangles, that is, to determine all angles and sides of a triangle from some given information.
- To understand the inverse trig functions \sin^{-1} , \cos^{-1} , and \tan^{-1} and their domains and ranges.
- To simplify expressions involving inverse trig functions by using triangles
- To solve equations involving trig functions on both restricted and unrestricted domains
- To be able to apply the Law of Cosines and the Law of Sines.
- To know the identities listed on the Trig Identities handout from March 10th.

2 Suggested Exercises

CHAPTER 17

- §17.1 #4
- §17.2 #1, 5
- §17.3 #2, 4, 5, 7, 10
- §17.4 #1, 6, 8, 10, 13

CHAPTER 18

- §18.1 #1, 4, 11, 12, 18, 24, 27, 32
- §18.2 #3, 4, 6, 8, 11
- §18.4 #7, 8, 11, 20
- §18.5 #6, 8, 12, 13, 26

CHAPTERS 19 & 20

- §19.1 #1, 2, 5
- §19.2 #4, 5, 7, 14, 15
- §19.3 #2, 4, 6, 12
- §19.4 #1, 5, 8, 10
- §20.1 #2, 3, 5
- §20.2 #2, 5, 7, 9
- §20.3 #4, 5, 8, 9, 10, 12, 13
- §20.4 #3, 4, 9, 10, 12, 22
- §20.5 #5, 6
- §20.6 #4, 5, 6, 9