

MATH 2110

Chapter 12

- Vectors
 - Definition
 - Magnitude of a vector
 - Constructing a vector given two points
 - Operations with vectors
 - * Addition/Subtraction
 - * Scalar multiplication
 - * Dot product (and what it tells us)
 - * Cross product (and what it tells us)
 - How to find the angle between two vectors
- Equation of lines
- Equations of planes

Chapter 13

- Vector-valued functions
 - Derivatives
 - Space curves
- Length of a curve

Chapter 14

- Level curves
- Partial derivatives
- Clairaut's Theorem
- Equation of the tangent plane to $z = f(x, y)$ (or $F(x, y, z) = k$) at a point
- Chain rule
- Directional derivative (and maximizing the directional derivative)
- Gradient vector
- Maximum/minimum values of $f(x, y)$ and saddle points

Chapter 15

- Double integrals over rectangles and general regions using either Cartesian coordinates or polar coordinates (and what it means to integrate 1 over a region D)
- Triple integrals using either Cartesian coordinates, cylindrical coordinates, or spherical coordinates (and what it means to integrate 1 over a bounded region E)

Chapter 16

- Line integrals (parametrize curves C) - both scalar and vector and knowing what it means to integrate 1 over C
- Fundamental Theorem for Line Integrals
- Conservative vector fields ($\nabla f = \vec{F}$, or if $\vec{F}(x, y) = P(x, y)\vec{i} + Q(x, y)\vec{j}$, then $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$)
- Green's Theorem
- Curl and Divergence of vector fields
- Parametrizing surfaces S
- Surface integrals - both scalar and vector and knowing what it means to integrate 1 over S
- Stokes' Theorem
- Divergence Theorem