| King Abdulaziz University | **Math 203 Syllabus** | Mathematics Department |
|---|---|---|
| Faculty of Science | | Second Semester ( 1434 – 1435 ) |

**Textbook: CALCULUS Early Transcendental, Seventh Edition (2010), Author: James Stewart**

| | | Lectures | | | | |
|---|---|---|---|---|---|---|
| **Chapter Title** | **Section Title** | **Subtitle** | **Examples** | **Exercises** | **Home Work** | **Remarks** |
| **Chapter 10** Parametric Equations and Polar Coordinates | **10.1** Curves Defined by Parametric Equations | Parametric Equations | **1,3,5** | **13,18,19** | 11-17, 20-22 | |
| | **10.2** Calculus with Parametric Curves | Tangents, Areas, Arc Length, Surface Area. | **1,2,3, 4,5,6** | | 1-6,8,9,10, 41,42,45,46 | |
| | **10.3** Polar Coordinates | Polar Coordinates, Polar Curves, Symmetry, Tangent to Polar Curves, Graphing Polar Curves with Graphing Devices. | **1,2,3,4, 5,7,9** | **16,24,25** | 1-6,9,11,15, 17,22 | |
| | **10.4** Areas and Arc Length in Polar Coordinates | Area, Arc Length. | **1** | **1,3,45,46** | 2,4,17, 19,47 | |
| | **10.5** Conic Sections | Parabola, Ellipse, Hyperbola, Shifted Conics. | **1,2,3,4, 5,6,7** | **8,16,33,34, 37,40,45,47** | 1-7,11-15, 31-48 | |
| | **10.6** Conic Sections in Polar Coordinates | Conic Sections in Polar Coordinates | **1,2** | **1,2,3, 9,13** | 4-8,10-15 | |

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| **Chapter 12** Vectors and the Geometry of Space | **12.1** Three-Dimensional Coordinate Systems | Distance Formula in Space, Equation of a Sphere. | **1,2,4, 6** | **10,18,31** | 7,8,15-17,24 | |
| | **12.2** Vectors | Combining Vectors, Vector Algebra Operations, Components, Unit Vectors | **1,2,3, 4,5,6** | **21,25** | 7-16,17,18, 20,22 | |
| | **12.3** The Dot Product | Definition and Properties of the Dot Product, Angle Between Vectors, Direction Angles and Direction Cosines, Projections. | **1,2,3,4, 5,6** | **38,41** | 1,2,3-10, 15-20,35-40 | |
| | **12.4** The Cross Product | Definition and Properties of the Cross Product, Triple Products. | **1,2,3,4,5** | **35** | 1-6,29-32,36 | |
| | **12.5** Equations of Lines and Planes | Parametric Equations of the Line, Planes. | **1,2,4, 5,6,7,9** | **20,21,22, 30,71** | 2-5,20, 23-28, 31,35,43-45 | |
| | **12.6** Cylinders and Quadric Surfaces | Cylinders, Quadric Surfaces. (**Table 1**) | **1,2,3, 4,6** | | | |
| **Chapter 13** Vector Functions | **13.1** Vector Functions and Space Curves | Limit and Continuity. | **1,2,4** | | 1,3,4,6,15 | |
| | **13.2** Derivatives and Integrals of Vector Functions | Derivatives, Unit Tangent Vector, Integrals. | **1, 4,5** | **18** | 9-12,17,18, 23,24,33-37 | |
| | **13.3** Arc Length and Curvature | Length, Curvature, The Normal and Binormal Vectors. | **1,3,4, 5,6** | **4** | 1,2,5,9, 21-25,43,44 | |
| | **13.4** Motion In Space: Velocity and Acceleration | Velocity, Speed, Acceleration, Tangential and Normal Components of Acceleration. | **1,2,3,7** | **39** | 3-14,16, 33,34 | |

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| **Chapter 14** Partial Derivatives | **14.1** Functions of Several Variables | Functions of Two Variables, Domain, Rang, Level Curves, Functions of Three or More Variables. | **1,4,6,8** | **9,13,20** | 7,8,9,10,12, 13,19 | |
| | **14.2** Limits and Continuity | Limits (Tables 1,2), Continuity, Functions of Three or More Variables. | **1,2,4,5, 7,8** | **14,17, 33** | 5,6,7,9,10,12 , 18,30,37,38 | |
| | **14.3** Partial Derivatives | Partial Derivatives of a Function of Two Variables, Functions of More Than Two Variables, Higher Derivatives, Laplace's Equation, Wave Equation. | **1,2,3,5, 6,7,8,9** | **17,34, 41,63** | 15,16,19,20, 21,22,26,27, 35,41,45,46, 48,51,53,61, 65 | |
| | **14.4** Tangent Planes and Linear Approximation | Linearization, Total Differential. | **2,4** | **12,25** | 2,3,4,6,11, 13,14,26,27 | |
| | **14.5** The Chain Rule | The Chain Rule, Implicit Differentiation. | **1,3,5,8,9** | **10,21, 30,34** | 2,4,6,7,8,24, 25,27-29,31 | |
| | **14.6** Directional Derivatives and Gradient Vector | Directional Derivatives, The Gradient Vector, Functions of Three Variables, Maximizing the Directional Derivatives, Tangent Planes to Level Surfaces, Normal Line. | **2,3,4,5, 6,8** | **9,12, 25,42** | 4,5,6,7,8,11, 12,21,24,25, 39,44 | |
| | **14.7** Maximum and Minimum Values | Local Maximum and Minimum Value, Saddle Point. | **3** | **6,7** | 1,2,8-18 | |
| | **14.8** Lagrange Multipliers | Lagrange Multiplier. | **2** | **4,7** | 3,5,6,8,9, 10-13 | |

**Notes:**

1- All examples and exercises in the lectures part must be solved by the instructor.

2- Homework should be solved and submitted to instructor.

**Marks distribution**

1- First Exam (90 Minutes ; 30 Marks); Second Exam (90 Minutes ; 30 Marks); Final Exam (120 Minutes ; 40 Marks).