

# Table of Contents

<b>Dedication</b>	iii
<b>Preface</b>	xv

## **Chapter 1: Introduction**

Introduction to Autodesk Inventor 2009	1-2
Part Module	1-2
Assembly Module	1-2
Presentation Module	1-3
Drawing Module	1-3
Sheet Metal Module	1-3
Getting Started with Autodesk Inventor	1-3
Toolbars	1-6
Part Module Toolbars	1-6
Assembly Panel Toolbar	1-9
Drawing Module Toolbars	1-10
Presentation Module Toolbar	1-11
Additional Design Tools	1-11
Panel Bars	1-11
Browser Bar	1-12
Units for Dimensions	1-13
Important Terms and their Definitions	1-13
Feature-based Modeling	1-13
Parametric Modeling	1-14
Bidirectional Associativity	1-14
Adaptive	1-14
Design Doctor	1-14
Constraints	1-15
Consumed Sketch	1-17
Cycling Through Entities	1-17
Hot Keys	1-17
Part Module	1-18
Assembly Module	1-19
Drawing Module	1-20
Presentation Module	1-20
Hot Key Customizing	1-20
Color Scheme	1-22

## **Chapter 2: Drawing Sketches for Solid Models**

The Sketching Environment	2-2
The Open Dialog Box	2-3
Starting a New File	2-5
Introduction to the Sketching Environment	2-7

Setting Up the Sketching Environment	2-7
Modifying the Grid Settings of the Drawing	2-8
Understanding the Drawing Display Tools	2-10
Zoom All	2-10
Zoom Window	2-10
Zoom	2-10
Pan	2-11
Zoom Selected	2-11
Sketching Entities	2-11
Drawing Lines	2-11
Drawing Circles	2-14
Drawing Ellipses	2-15
Drawing Arcs	2-16
Drawing Rectangles	2-17
Drawing Polygons	2-19
Placing Points/Center Points	2-20
Creating Fillets	2-20
Creating Chamfers	2-21
Drawing Splines	2-23
Deleting Sketched Entities	2-23
Tutorial 1	2-24
Tutorial 2	2-30
Tutorial 3	2-32
Tutorial 4	2-37
Self-Evaluation Test	2-39
Review Questions	2-40
Exercise 1	2-41
Exercise 2	2-41

### Chapter 3: Adding Constraints and Dimensions to Sketches

Adding Geometric Constraints to the Sketch	3-2
Perpendicular Constraint	3-2
Parallel Constraint	3-2
Tangent Constraint	3-3
Coincident Constraint	3-3
Concentric Constraint	3-3
Collinear Constraint	3-4
Horizontal Constraint	3-4
Vertical Constraint	3-4
Equal Constraint	3-5
Fix Constraint	3-5
Symmetric Constraint	3-5
Smooth Constraint	3-6
Viewing the Constraints Applied to a Sketched entity	3-6
Controlling Constraints and Applying them Automatically While Sketching	3-7
Selecting the Constraints	3-7
Applying the Constraints	3-8

Deleting Geometric Constraints	3-8
Adding Dimensions to Sketches	3-9
Creating Driven Dimensions	3-15
Understanding the Concept of Fully Constrained Sketches	3-16
Measuring Sketched Entities	3-17
Measuring Distances	3-17
Measuring Angles	3-19
Measuring Loops	3-20
Measuring Area	3-20
Adding the Linear Measurements	3-21
Clearing the Accumulated Dimensions	3-21
Evaluating the Region Properties	3-21
Tutorial 1	3-22
Tutorial 2	3-28
Tutorial 3	3-33
Tutorial 4	3-38
Self-Evaluation Test	3-41
Review Questions	3-41
Exercise 1	3-42
Exercise 2	3-43
Exercise 3	3-43
Exercise 4	3-44
Exercise 5	3-44

#### **Chapter 4: Editing, Extruding, and Revolving Sketches**

Editing Sketched Entities	4-2
Extending Sketched Entities	4-2
Trimming Sketched Entities	4-2
Splitting Sketched Entities	4-3
Offsetting Sketched Entities	4-4
Mirroring Sketched Entities	4-5
Moving Sketched Entities	4-5
Rotating Sketched Entities	4-9
Creating Patterns	4-10
Creating Rectangular Patterns	4-11
Creating Circular Patterns	4-14
Writing Text in the Sketching Environment	4-17
Writing Regular Text	4-17
Writing Text Aligned to a Geometry	4-19
Inserting Images and Documents in Sketches	4-21
Editing Sketched Entities by Dragging	4-22
Tolerances	4-23
Converting the Base Sketch into a Base Feature	4-24
Extruding the Base Sketch	4-25
Revolving the Base Sketch	4-28
Rotating the View of a Model in 3D Space	4-31
Rotating the View of a Model Using Orbit	4-31

Changing the View Using ViewCube	4-33
Navigating the Model Using the SteeringWheels	4-36
Controlling the Display of Models	4-36
Setting Display Modes	4-36
Setting the Camera Type	4-37
Setting the Shadow Options	4-38
Tutorial 1	4-39
Tutorial 2	4-43
Tutorial 3	4-46
Tutorial 4	4-51
Self-Evaluation Test	4-54
Review Questions	4-54
Exercise 1	4-56
Exercise 2	4-56
Exercise 3	4-57
Exercise 4	4-57
Exercise 5	4-58

## Chapter 5: Other Sketching and Modeling Options

Why Do You Need Other Sketching Planes?	5-2
Defining a New Sketching Plane	5-3
Work Features	5-3
Creating Work Planes	5-3
Creating Work Axes	5-11
Creating Work Points	5-13
Other Extrusion Options	5-14
Other Revolution Options	5-20
The Concept of Sketch Sharing	5-21
Tutorial 1	5-22
Tutorial 2	5-28
Tutorial 3	5-33
Self-Evaluation Test	5-37
Review Questions	5-38
Exercise 1	5-39
Exercise 2	5-40
Exercise 3	5-41
Exercise 4	5-42

## Chapter 6: Advanced Modeling Tools-I

Advanced Modeling Tools	6-2
Creating Holes	6-2
Creating Fillets	6-12
Creating Chamfers	6-22
Mirroring Features and Models	6-23
Creating Rectangular Patterns	6-26
Creating Circular Patterns	6-29
Creating Rib Features	6-32

Thickening or Offsetting the Faces of Features	6-34
Creating Embossed and Engraved Features	6-37
Transferring Images on a Feature	6-39
Assigning Different Colors/Styles to the Model	6-40
Tutorial 1	6-41
Tutorial 2	6-46
Tutorial 3	6-51
Tutorial 4	6-57
Self-Evaluation Test	6-60
Review Questions	6-61
Exercise 1	6-62
Exercise 2	6-63

## **Chapter 7: Editing Features and Adding Automatic Dimensions to Sketches**

Concept of Editing Features	7-2
Editing Features of a Model	7-2
Updating Edited Features	7-4
Dynamically Editing Features Using 3D Grips	7-4
Editing Sketches of Features	7-6
Redefining the Sketching Plane of a Sketched Feature	7-8
Suppressing Features	7-10
Unsuppressing the Suppressed Features	7-10
Moving Faces of a Solid	7-10
Moving Faces Using the Direction Distance Method	7-11
Moving Faces Using the Planar Move Method	7-11
Deleting Features	7-12
Copying and Pasting Features	7-12
Adding Automatic Dimensions to Sketches	7-15
Projecting Entities in the Sketching Environment	7-16
Projecting Edges or Faces	7-16
Projecting Cutting Edges	7-17
Tutorial 1	7-18
Tutorial 2	7-24
Tutorial 3	7-27
Self-Evaluation Test	7-32
Review Questions	7-33
Exercise 1	7-34
Exercise 2	7-35
Exercise 3	7-36
Exercise 4	7-37

## **Chapter 8: Advanced Modeling Tools-II**

Advanced Modeling Tools	8-2
Creating Sweep Features	8-2
Creating Lofted Features	8-8
Creating Coil Features	8-18

Creating Threads	8-22
Creating Shell Features	8-26
Applying Face Drafts	8-28
Creating Split Features	8-30
Trimming Surfaces	8-32
Extending Surfaces	8-34
Deleting Faces	8-35
Replacing Faces with Surfaces	8-36
Creating Planar Boundary Patches	8-38
Stitching Surfaces	8-40
Working with the Sculpt Tool	8-40
Working with the Bend Part Tool	8-41
Reordering Features	8-44
Using the Sketch Doctor	8-46
Using the Design Doctor	8-46
Tutorial 1	8-48
Tutorial 2	8-52
Tutorial 3	8-54
Tutorial 4	8-56
Tutorial 5	8-59
Self-Evaluation Test	8-62
Review Questions	8-63
Exercise 1	8-64
Exercise 2	8-65

## Chapter 9: Assembly Modeling-I

Assembly Modeling	9-2
Types of Assemblies	9-2
Creating Top-down Assemblies	9-4
Creating Components in the Assembly Module	9-4
Creating Bottom-up Assemblies	9-7
Placing Components in the Assembly File	9-8
Assembling Components	9-9
Mate Constraint	9-9
Angle Constraint	9-12
Tangent Constraint	9-14
Insert Constraint	9-14
Rotation Constraint	9-15
Rotation-Translation Constraint	9-16
Transitional Constraint	9-17
Using ALT+Drag to Apply Assembly Constraints	9-17
Moving Individual Components	9-18
Rotating Individual Components in 3D Space	9-19
Tutorial 1	9-19
Tutorial 2	9-37
Self-Evaluation Test	9-43
Review Questions	9-44
Exercise 1	9-45

## Chapter 10: Assembly Modeling-II

Editing Assembly Constraints	10-2
Editing Components	10-3
Editing Components in the Assembly File	10-3
Editing Components by Opening their Part Files	10-5
Creating Subassemblies	10-6
Creating Subassembly Using the Bottom-up Design	10-6
Creating Subassembly Using top Top-down Design	10-6
Checking Degrees of Freedom of a Component	10-6
Creating Pattern of the Components in an Assembly	10-7
Replacing a Component in the Assembly File with Another Component	10-11
Replacing a Single Instance of the Selected Component	10-11
Replacing all Instances of the Selected Component	10-12
Mirroring Subassemblies or Components of an Assembly	10-12
Copying Subassemblies or Components of an Assembly	10-16
Deleting Components	10-16
Editing the Pattern of Components	10-17
Making a Pattern Instance Independent	10-17
Deleting Assembly Constraints	10-18
Creating the Assembly Section Views in the Assembly File	10-18
Analyzing Assemblies for Interference	10-19
Creating the Design View Representations	10-21
Simulating the Motion of Components of an Assembly by Driving the Assembly Constraints	10-22
Creating Positional Representations	10-26
Viewing the Bill of Materials of the Current Assembly	10-27
Working with Assembly Features	10-28
Tutorial 1	10-28
Tutorial 2	10-31
Tutorial 3	10-33
Self-Evaluation Test	10-39
Review Questions	10-40
Exercise 1	10-41

## Chapter 11: Working with Drawing Views-I

The Drawing Module	11-2
Types of Views	11-3
Generating Drawing Views	11-5
Generating the Base View	11-5
Generating Projected Views	11-10
Generating Auxiliary Views	11-11
Generating Section Views	11-12
Generating Detail Views	11-14
Generating Broken Views	11-16
Generating Break Out Views	11-18
Generating Overlay Views	11-20

Generating Slice Views	11-21
Drafting Drawing Views	11-22
Editing Drawing Views	11-23
Deleting Drawing Views	11-24
Moving Drawing Views	11-25
Copying Drawing Views	11-25
Rotating Drawing Views	11-26
Assigning Different Hatch Patterns to the Components in the Assembly	
Section Views	11-27
Suppressing Components in the Assembly Section Views	11-28
Tutorial 1	11-30
Tutorial 2	11-36
Self-Evaluation Test	11-41
Review Questions	11-41
Exercise 1	11-43

## Chapter 12: Working with Drawing Views-II

Modifying Drawing Standards	12-2
Inserting Additional Sheets	12-3
Activating a Drawing Sheet	12-3
Displaying Dimensions in the Drawing Views	12-3
Retrieving Parametric Dimensions in the Drawing Views	12-4
Adding Reference Dimensions	12-5
Modifying the Model Dimensions	12-5
Editing Drawing Sheets	12-6
Creating Dimension Styles	12-8
Applying Dimension Styles	12-9
Modifying the Dimension Appearance Using the Shortcut Menu	12-9
Adding the Parts List	12-9
Editing the Parts List	12-12
Setting the Standard for the Parts List	12-15
Adding Balloons to the Assembly Drawing Views	12-15
Adding Balloons to the Selected Components	12-16
Adding Automatic Balloons	12-17
Adding Text to the Drawing Sheet	12-18
Adding Multiline Text without Leader	12-19
Adding Multiline Text with Leader	12-19
Tutorial 1	12-21
Tutorial 2	12-26
Tutorial 3	12-31
Self-Evaluation Test	12-35
Review Questions	12-36
Exercise 1	12-37



**Chapter 13: Presentation Module**

The Presentation Module	13-2
Creating the Presentation View	13-3
Defining Units for the Presentation Files	13-6
Tweaking Components in the Presentation View	13-6
Animating Assemblies	13-10
Rotating the Presentation View Precisely	13-14
Tutorial 1	13-16
Tutorial 2	13-23
Self-Evaluation Test	13-30
Review Questions	13-31
Exercise 1	13-32

**Chapter 14: Working with Special Design Tools**

Adaptive Parts	14-2
Defining Parameters	14-2
Working with iParts	14-6
Types of iPart Factories	14-6
Creating iPart Factories	14-7
Placing an iPart in an Assembly	14-12
Changing the iParts in the Assembly File	14-16
Creating 3D Sketches	14-16
Line	14-16
Spline	14-17
Bend	14-17
Include Geometry	14-18
3D Intersection Curve	14-18
Helical Curve	14-19
Tutorial 1	14-20
Tutorial 2	14-25
Tutorial 3	14-30
Tutorial 4	14-33
Tutorial 5	14-37
Self-Evaluation Test	14-44
Review Questions	14-45
Exercise 1	14-46

**Chapter 15: Working with Sheet Metal Components**

The Sheet Metal Module	15-2
Setting the Sheet Metal Component Parameters	15-4
Setting the Sheet Metal Rule	15-4
Setting the Material Style	15-12
Setting the Unfolding rule	15-12
Creating Sheet Metal Components	15-14
Folding Parts of Sheet Metal Components	15-17
Adding Flanges to Sheet Metal Components	15-19
Creating Cuts in Sheet Metal Components	15-25

Creating Seams at Corners of Sheet Metal Components	15-26
Bending Sheet Metal Faces	15-30
Rounding Corners of Sheet Metal Components	15-33
Chamfering Corners of Sheet Metal Components	15-34
Punching 3D Shapes into Sheet Metal Components	15-36
Creating Hems	15-38
Creating Contour Flanges	15-40
Creating Flat Patterns of Sheet Metal Components	15-43
Tutorial 1	15-44
Tutorial 2	15-51
Self-Evaluation Test	15-57
Review Questions	15-58
Exercise 1	15-59

## Chapter 16: Introduction to Weldments

Understanding Weldment Assemblies	16-2
Major Types of Welds in Autodesk Inventor	16-3
Adding Welds to Assemblies	16-6
Creating Fillet Welds	16-7
Creating Cosmetic Welds	16-9
Creating Groove Welds	16-10
Tutorial 1	16-12
Tutorial 2	16-16

## Chapter 17: Miscellaneous Tools

Introduction	17-2
Copying the Sketches	17-2
Scaling the Sketches	17-3
Finding the Center of Gravity	17-3
Extracting the iFeature	17-4
Inserting the iFeature	17-6
Creating iMates	17-7
Applying the iMates in the Assembly Environment	17-8
Creating the iProperties	17-9
Creating User-Defined Drawing Sheets	17-11
Sheet Formats	17-11
Borders	17-12
Title Blocks	17-13
Creating Sketch Symbols	17-17
Tutorial 1	17-18
Tutorial 2	17-22
Self-Evaluation Test	17-26
Review Questions	17-27
Exercise 1	17-28
Exercise 2	17-28

<b>Student Projects</b>	1
-------------------------	---

<b>Index</b>	1
--------------	---