

CONTENTS

Dedication	iii
Preface	xv

Chapter 1: The User Coordinate System

The User Coordinate System (UCS)	1-2
Controlling the Visibility of the UCS Icon	1-2
Defining the New UCS	1-4
Managing the UCS through the Dialog Box	1-19
System Variables	1-23
Self-Evaluation Test	1-23
Review Questions	1-24

Chapter 2: Getting Started with 3D

Starting Three Dimensional (3D) Modeling in AutoCAD	2-2
Use of Three-dimensional Drawing	2-2
Types of 3D Models	2-3
Wireframe Models	2-3
Surface Models	2-3
Solid Models	2-4
Conventions Followed in AutoCAD	2-4
Changing the Viewpoint to View 3D Models	2-5
Changing the Viewpoint Using the ViewCube	2-6
Changing the Viewpoint Using the Ribbon or the Toolbar	2-7
Changing the Viewpoint Using the Viewpoint Presets Dialog Box	2-9
Changing the Viewpoint Using the VPOINT Command	2-11
In-Canvas Viewport Control	2-13
3D Coordinate Systems	2-15
Absolute Coordinate System	2-15
Relative Coordinate System	2-16
Direct Distance Entry Method	2-19
Trim, Extend, and Fillet Tools in 3D	2-21

Setting Thickness and Elevation for New Objects	2-22
The ELEV Command	2-22
Suppressing the Hidden Edges	2-24
Creating 3D Polylines	2-24
Converting Wireframe Models into Surface Models	2-25
Creating 3D Faces	2-25
Creating Polyface Meshes	2-26
Controlling the Visibility of the 3D Face Edges	2-27
Creating Planar Surfaces	2-27
The 3DMESH Command	2-28
Editing the Surface Mesh	2-28
The Edit Polyline Tool	2-29
Dynamic Viewing of 3D Objects	2-31
Using the SteeringWheels	2-31
Dynamically Rotating the View of a Model	2-35
Clipping the View of a Model Dynamically	2-42
Nudge Functionality	2-43
Self-Evaluation Test	2-43
Review Questions	2-44

Chapter 3: Creating Solid Models

What is Solid Modeling?	3-2
Creating Predefined Solid Primitives	3-2
Creating a Solid Box	3-2
Creating a Solid Cone	3-5
Creating a Solid Cylinder	3-7
Creating a Solid Sphere	3-8
Creating a Solid Torus	3-9
Creating a Solid Wedge	3-10
Creating a Pyramid	3-10
Creating a Polysolid	3-11
Creating a Helix	3-14
Modifying the Visual Styles of Solids	3-16
Controlling the Settings of Edges	3-21
Controlling the Face Display	3-23
Controlling the Backgrounds	3-24
Creating Complex Solid Models	3-24
Creating Regions	3-24
Creating Complex Solid Models by Applying Boolean Operations	3-25
Combining Solid Models	3-25
Subtracting One Solid From the Other	3-25
Intersecting Solid Models	3-26
Checking Interference in Solids	3-26
Dynamic UCS	3-32
Defining the New UCS Using the ViewCube and the Ribbon	3-33
Creating Extruded Solids	3-33

Extruding along the Normal	3-34
Extruding with a Taper Angle	3-34
Extruding along a Direction	3-35
Extruding along a Path	3-35
Extruding using Expressions	3-36
Creating Revolved Solids	3-36
Creating Swept Solids	3-37
Creating Lofted Solids	3-41
Creating Presspull Solids	3-51
Self-Evaluation Test	3-60
Review Questions	3-61

Chapter 4: Editing 3D Objects-I

Filleting Solid Models	4-2
Chamfering Solid Models	4-3
Rotating Solid Models in 3D Space	4-4
Rotating Solid Models about an Axis	4-6
Mirroring Solid Models in 3D Space	4-7
Moving Models in 3D Space	4-12
Creating Arrays in 3D Space	4-13
Aligning Solid Models	4-15
Aligning Solids by Defining an Alignment Plane	4-17
Extracting Edges of a Solid Model	4-18
Converting Objects to Surfaces	4-19
Converting Objects to Solids	4-20
Converting Surfaces to Solids	4-20
Point Cloud	4-21
Attaching the Point Cloud	4-21
Autodesk ReCap	4-23
Slicing Solid Models	4-28
Creating the Cross-Sections of Solids	4-31
Self-Evaluation Test	4-35
Review Questions	4-36

Chapter 5: Editing 3D Objects-II

Editing Solid Models	5-2
Editing Faces of a Solid Model	5-2
Editing Edges of a Solid Model	5-7
Editing Entire Body of a Solid Model	5-9
Generating a Section by Defining a Section Plane	5-12
Solid History	5-18
Generating Drawing Views of a Solid Model	5-19
Solid View	5-20
Solid Drawing	5-22
Solid Profile	5-23

Drawing Views	5-23
Base	5-23
Projected View	5-25
Edit View	5-25
Update View	5-26
Auto Update	5-26
Drafting Standard	5-26
Generating Section Views	5-27
Creating Flatshot	5-31
Calculating the Mass Properties of Solid Models	5-34
Recording the Drawing Steps by Using the Action Recorder	5-36
Using ShowMotion for Presentation	5-37
Playing the Animation	5-39
Self-Evaluation Test	5-40
Review Questions	5-41

Chapter 6: Surface Modeling

Surface Modeling	6-2
Creating Wireframe Elements	6-2
Spline CV	6-2
Spline Fit	6-3
Spline Freehand	6-3
Extract Isoline Curves	6-3
Creating Surfaces by Using Profiles	6-3
Creating an Extruded Surface	6-4
Creating a Revolved Surface	6-5
Creating a Loft Surface	6-6
Creating a Sweep Surface	6-6
Creating a Planar Surface	6-6
Creating a Network Surface	6-7
Creating Surfaces from other Surfaces	6-7
Creating a Blend Surface	6-8
Creating a Patch Surface	6-10
Creating an Offset Surface	6-11
Editing Surfaces	6-12
Creating Fillets	6-12
Trimming Surfaces	6-13
Untrimming Surfaces	6-15
Extending Surfaces	6-15
Sculpting Surfaces	6-16
Extracting Intersections	6-17
NURBS Surfaces	6-26
Projecting Geometries	6-30
Performing Surface Analysis	6-37
Zebra	6-37
Analysis Curvature	6-38

Analysis Draft	6-39
Self-Evaluation Test	6-39
Review Questions	6-40

Chapter 7: Mesh Modeling

Introduction	7-2
Creating Mesh Primitives	7-2
Creating a Mesh Box	7-2
Creating Surface Meshes	7-4
Creating Revolved Surface Meshes	7-5
Creating Edge Surface Meshes	7-6
Creating Ruled Surface Meshes	7-7
Creating Tabulated Surface Meshes	7-8
Modifying Mesh Objects	7-9
Adding Smoothness to Meshes	7-10
Refining the Meshes	7-13
Adding Crease to Meshes	7-14
Editing Mesh Faces	7-16
Splitting the Mesh Faces	7-16
Extruding the Mesh Faces	7-17
Merging the Mesh Faces	7-18
Closing the Gaps	7-18
Collapsing the Mesh Vertices	7-19
Spinning the Edges of Triangular Faces	7-19
Converting Mesh Objects	7-24
Converting Mesh Objects into Solids	7-24
Converting Mesh Objects into Surfaces	7-26
Working with Gizmos	7-27
Move Gizmo	7-27
Rotate Gizmo	7-28
Scale Gizmo	7-28
Self-Evaluation Test	7-37
Review Questions	7-38

Chapter 8: Rendering and Animating Designs

Understanding the Concept of Rendering	8-2
Assigning Materials	8-2
Materials Browser	8-3
Assigning Selected Materials to Objects	8-5
Attaching Material by Layers	8-6
Creating and Editing Materials	8-6
Basic Rendering	8-8
Creating New Materials	8-10
Mapping Materials on Objects	8-16
Converting Materials Created in Previous AutoCAD Release into AutoCAD 2016 Format	8-20

Adding Lights to the Design	8-20
Default Light	8-21
Point Light	8-22
Spotlight	8-30
Distant Light	8-32
Web Light	8-33
Sun Light	8-33
Converting Lights Created in AutoCAD's Previous Release into AutoCAD 2016 Format	8-40
Modifying Lights	8-41
Understanding Rendering Presets <i>Enhanced</i>	8-42
Controlling the Rendering Environment	8-44
Rendering with a Background	8-44
Adjusting the Lighting Exposure to Rendered Image	8-45
Rendering a Model with Different Render Settings	8-45
Obtaining Rendering Information	8-48
Saving a Rendered Image	8-48
Saving the Rendered Image to a File	8-48
Saving the Viewport Rendering	8-49
Saving the Rendered Image from the Render Window	8-49
Plotting Rendered Images	8-49
Unloading AutoCAD Render	8-50
Working with Cameras	8-50
Create Camera	8-50
Editing the Cameras	8-52
Creating Animations	8-53
Creating Animation of 3D Navigations	8-53
Creating Animation by Defining the Path of the Camera Movement	8-55
Self-Evaluation Test	8-59
Review Questions	8-60

Chapter 9: AutoCAD on Internet

Introduction	9-2
BROWSER	9-2
HYPERLINK	9-2
HYPERLINKFWD	9-2
HYPERLINKBACK	9-2
HYPERLINKSTOP	9-2
PASTEASHYPERLINK	9-2
HYPERLINKBASE	9-2
Changed Internet Commands	9-2
Understanding URLs	9-3
Launching a Web Browser	9-5
Changing the Default Website	9-5
Drawings on the Internet	9-6
Opening Drawings from the Internet	9-6

Inserting a Block from the Internet	9-9
Accessing Other Files on the Internet	9-10
Saving a Drawing on the Internet	9-10
Online Resources	9-11
Using Hyperlinks with AutoCAD	9-12
Pasting as Hyperlink	9-18
Editing Hyperlinks	9-18
Removing Hyperlinks from Objects	9-18
The Drawing Web Format	9-18
Creating a DWF File	9-19
AutoCAD 360	9-27
Setting Sync	9-27
Online Options	9-28
Self-Evaluation Test	9-29
Review Questions	9-30

Chapter 10: Script Files and Slide Shows

What Are Script Files?	10-2
Running Script Files	10-4
Repeating Script Files	10-10
Introducing Time Delay in Script Files	10-11
Resuming Script Files	10-11
Command Line Switches	10-12
Running a Script File while Loading AutoCAD	10-12
What is a Slide Show?	10-21
What are Slides?	10-21
Creating Slides	10-22
Viewing Slides	10-23
Preloading Slides	10-25
Slide Libraries	10-27
Self-Evaluation Test	10-31
Review Questions	10-32

Chapter 11: Creating Linetypes and Hatch Patterns

Standard Linetypes	11-2
Linetype Definitions	11-2
Elements of Linetype Specification	11-3
Creating Linetypes	11-3
Alignment Specification	11-9
LTSCALE Command	11-9
LTSCALE Factor for Plotting	11-12
Current Linetype Scaling (CELTSCALE)	11-12
Alternate Linetypes	11-13
Modifying Linetypes	11-14
Complex Linetypes	11-17
Creating a String Complex Linetype	11-17

Hatch Pattern Definition	11-26
How Hatch Works?	11-28
Simple Hatch Pattern	11-29
Effect of Angle and Scale Factor on Hatch	11-30
Hatch Pattern with Dashes and Dots	11-30
Hatch with Multiple Descriptors	11-33
Saving Hatch Patterns in a Separate File	11-37
Custom Hatch Pattern File	11-37
Self-Evaluation Test	11-38
Review Questions	11-39

Chapter 12: Customizing the acad.pgp File

What is the acad.pgp File?	12-2
Sections of the acad.pgp File	12-8
Reinitializing the acad.pgp File	12-10
Self-Evaluation Test	12-12
Review Questions	12-13

Chapter 13: Technical Drawing with AutoCAD

Multiview Drawings	13-2
Understanding the X, Y, and Z Axes	13-2
Orthographic Projections	13-2
Positioning Orthographic Views	13-5
Dimensioning	13-9
Dimensioning Components	13-10
Basic Dimensioning Rules	13-10
Sectional Views	13-20
Full Section	13-20
Half Section	13-21
Broken Section	13-22
Revolved Section	13-22
Removed Section	13-23
Offset Section	13-24
Aligned Section	13-25
Cutting Plane Lines	13-25
Spacing for Hatch Lines	13-27
Direction of Hatch Lines	13-27
Points to Remember	13-28
Auxiliary Views	13-31
Detail Drawing, Assembly Drawing, and Bill of Materials	13-35
Self-Evaluation Test	13-38
Review Questions	13-39

Chapter 14: Isometric Drawings

Isometric Drawings	14-2
Isometric Projections	14-2

Isometric Axes and Planes	14-3
Setting the Isometric Grid and Snap	14-3
Drawing Isometric Circles	14-7
Creating Fillets in Isometric Drawings	14-8
Dimensioning Isometric Objects	14-8
Isometric Text	14-10
Self-Evaluation Test	14-11
Review Questions	14-12
Index	I-1