Contents

Preface ix Acknowledgments xi

Part I Using and making maps

Chapter 1 Introduction

- Tutorial 1-1 Opening and saving a map document 2
- Tutorial 1-2 Working with map layers 5
- Tutorial 1-3 Navigating in a map document 12
- Tutorial 1-4 Measuring distances 21
- Tutorial 1-5 Working with feature attributes 24
- Tutorial 1-6 Selecting features 29
- Tutorial 1-7 Changing selection options 30
- Tutorial 1-8 Working with attribute tables 36
- Tutorial 1-9 Labeling features 43
- Assignment 1-1 Analyze population by race in the top 10 US states 46
- Assignment 1-2 Produce a crime map 49

Chapter 2 Map design 51

- Tutorial 2-1 Creating point and polygon maps using qualitative attributes 52
- Tutorial 2-2 Creating point and polygon maps using quantitative attributes 62
- Tutorial 2-3 Creating custom classes for a map 66
- Tutorial 2-4 Creating custom colors for a map 70
- Tutorial 2-5 Creating normalized and density maps 73
- Tutorial 2-6 Creating dot density maps 78
- Tutorial 2-7 Creating fishnet maps 80
- Tutorial 2-8 Creating group layers and layer packages 86
- Assignment 2-1 Create a map showing schools in New York City by type 92
- Assignment 2-2 Create maps for military sites and congressional districts 93
- Assignment 2-3 Create maps for US veteran unemployment status 95

Chapter 3 GIS outputs 97

- Tutorial 3-1 Building an interactive GIS 97
- Tutorial 3-2 Creating map layouts 104
- Tutorial 3-3 Reusing a custom map layout 111
- Tutorial 3-4 Creating a custom map template with two maps 113
- Tutorial 3-5 Adding a report to a layout 119

Tutorial 3-6 Adding a graph to a layout 121

Tutorial 3-7 Building a map animation 123

Tutorial 3-8 Using ArcGIS Online 128

Assignment 3-1 Create a dynamic map of historic buildings in downtown Pittsburgh 128

Assignment 3-2 Create a layout comparing 2010 elderly and youth population compositions in Orange County,

California 130

Assignment 3-3 Create an animation for an auto theft crime time series 131

Part II Working with spatial data

Chapter 4 File geodatabases 133

Tutorial 4-1 Building a file geodatabase 133

Tutorial 4-2 Using ArcCatalog utilities 136

Tutorial 4-3 Modifying an attribute table 139

Tutorial 4-4 Joining tables 142

Tutorial 4-5 Creating centroid coordinates in a table 144

Tutorial 4-6 Aggregating data 148

Assignment 4-1 Investigate educational attainment 153

Assignment 4-2 Compare serious crime with poverty in Pittsburgh 155

Chapter 5 Spatial data 159

Tutorial 5-1 Examining metadata 160

Tutorial 5-2 Working with world map projections 162

Tutorial 5-3 Working with US map projections 165

Tutorial 5-4 Working with rectangular coordinate systems 167

Tutorial 5-5 Learning about vector data formats 172

Tutorial 5-6 Exploring raster basemaps from Esri web services 178

Tutorial 5-7 Downloading raster maps from the USGS 181

Chapter 6 Geoprocessing 185

Tutorial 6-1 Extracting features for a study area 185

Tutorial 6-2 Clipping features 190

Tutorial 6-3 Dissolving features 192

Tutorial 6-4 Merging features 195

Tutorial 6-5 Intersecting layers 199

Tutorial 6-6 Unioning layers 202

Tutorial 6-7 Automating geoprocessing using ModelBuilder 208

Assignment 6-1 Build a study region for Colorado counties 220

Assignment 6-2 Dissolve property parcels to create a zoning map 222

Assignment 6-3 Build a model to create a fishnet map layer for a study area 223

Chapter 7 Digitizing 227

Tutorial 7-1 Digitizing polygon features 228

Tutorial 7-2 Digitizing line features 239

Tutorial 7-3 Digitizing point features 245

Tutorial 7-4 Using advanced editing tools 248

Tutorial 7-5 Spatially adjusting features 255

Assignment 7-1 Digitize police beats 259

Chapter 8 Geocoding 263

Tutorial 8-1 Geocoding data by ZIP Code 263

Tutorial 8-2 Geocoding data by street address 268

Tutorial 8-3 Correcting source addresses using interactive rematch 274

Tutorial 8-4 Correcting street reference layer addresses 276

Tutorial 8-5 Using an alias table 281

Assignment 8-1 Geocode household hazardous waste participants to ZIP Codes 282

Assignment 8-2 Geocode immigrant-run businesses to Pittsburgh streets 284

Assignment 8-3 Examine match option parameters for geocoding 285

Part III Analyzing spatial data

Chapter 9 Spatial analysis 289

Tutorial 9-1 Buffering points for proximity analysis 290

Tutorial 9-2 Conducting a site suitability analysis 295

Tutorial 9-3 Using multiple ring buffers for calibrating a gravity model 299

Assignment 9-1 Analyze population in California cities at risk for earthquakes 308

Assignment 9-2 Analyze visits to the Jack Stack public pool in Pittsburgh 310

Chapter 10 ArcGIS 3D Analyst for Desktop 313

Tutorial 10-1 Creating a 3D scene 314

Tutorial 10-2 Creating a TIN from contours 315

Tutorial 10-3 Draping features onto a TIN 320

Tutorial 10-4 Navigating scenes 326

Tutorial 10-5 Creating an animation 330

Tutorial 10-6 Using 3D effects 332

Tutorial 10-7 Using 3D symbols 335

Tutorial 10-8 Editing 3D objects 339

Tutorial 10-9 Using 3D Analyst for landform analysis 342

Tutorial 10-10 Exploring ArcGlobe 348

Assignment 10-1 Develop a 3D presentation for downtown historic sites 352

Assignment 10-2 Topographic site analysis 354

Assignment 10-3 3D animation of a conservatory study area 355

Chapter 11 ArcGIS Spatial Analyst for Desktop 357

Tutorial 11-1 Processing raster map layers 358

Tutorial 11-2 Creating a hillshade raster layer 363

Tutorial 11-3 Making a kernel density map 365

Tutorial 11-4 Extracting raster value points 371

Tutorial 11-5 Conducting a raster-based site suitability study 374

Assignment 11-1 Create a mask and hillshade for suburbs 381

Assignment 11-2 Estimate heart attack fatalities outside hospitals by gender 383

Chapter 12 ArcGIS Network Analyst for Desktop 385

Tutorial 12-1 Solving the "traveling salesperson" problem 386

Tutorial 12-2 Building a TIGER-based network dataset 394

Tutorial 12-3 Creating travel polygons 402

Tutorial 12-4 Locating facilities 409

Tutorial 12-5 Routing vehicles from depots to demand points 414

Assignment 12-1 Geographic access to federally qualified health centers 421

Assignment 12-2 Analyze visits to the Phillips public pool in Pittsburgh 423

Assignment 12-3 Locate new farmers' markets in Washington, DC 424

Appendix Data source credits 427