CS 240 Final Exam Topics

Java
Write a class, including:

1) toString, equals, and hashCode methods
2) Implement the Comparable interface

Databases
Relational Data Model

Primary keys, Foreign keys, Null
Model a given problem with a relational schema
Modeling relationships: One-to-One, One-to-Many, Many-to-Many

SQL
Create Table, Drop Table
Insert, Update, Delete
Select

SELECT, FROM, WHERE
JOINS

Transactions
What are they?
How do they work in JDBC

XML / Object Serialization
How to parse XML files using the StAX and DOM parsers
What is “object serialization”?
How to serialize a graph of objects using Java’s built-in serialization
Web Services
What is a “web service”?

The HTTP protocol

Request message format, Response message format, Headers

Difference between GET and POST request methods

Response codes (200, 404, etc.)

How to make a web request in Java using URL and HttpURLConnection classes

Software Engineering
Principles of Software Design (Study the paper & slides on the web site)

1. Abstraction
   a. Naming
   b. Cohesion
   c. Abstracting All the Way
2. Decomposition
   a. Levels of Design (System, Subsystem, Package, Class, Routine)
   b. Hypo- and Hyper- Decomposition
   c. Size and Length Metrics
   d. Complexity Metrics
3. Algorithm & Data Structure Selection
4. Minimize Dependencies (or, Low Coupling)
   a. Separation of Interface and Implementation
   b. Information Hiding
5. Avoid Code Duplication

Describe the attributes of a well-designed class

Unit Testing: Role in software development, how it is done, benefits

Defensive Programming: Assertions & Parameter Checking

Testing
Levels of testing: Unit, Integration, System

Black Box Testing

Principles of “Equivalence Partitioning” and “Boundary Value Analysis”

Design a set of black box test cases for a program or method using EP and BVA.
White Box Testing

Line Coverage, Branch Coverage, Condition Testing (Complete & Partial)

Design a set of white box test cases for a method that achieves {Line Coverage, Branch Coverage, Complete Condition Testing, or Partial Condition Testing}

GUIs

Drawing

Origin in top-left corner, Color class, JComponent.paint(Graphics), drawLine, drawImage, etc.

Event Handling

Listeners: MouseListener, MouseMotionListener, KeyListener, FocusListener, WindowListener, ComponentListener, etc.

Writing anonymous inner classes

The concept of “keyboard focus”

Layout

Layout Managers: Flow, Grid, Border, Box, GridBag; how to layout components with each

Streams & Files

Reading/writing bytes with the InputStream/OutputStream interfaces

Using “filters” to add features to InputStreams/OutputStreams

Reading binary-formatted data with DataInputStream/DataOutputStream

Reading/writing characters with Reader/Writer interfaces

Converting InputStream to Reader with InputStreamReader

Converting OutputStream to Writer with OutputStreamWriter

Writing text-formatted data with PrintWriter

Reading text-formatted data with Scanner

Random file access with RandomAccessFile