Format dates, numbers, and messages. Be able to format dates, numbers, and messages into various String formats, and know how locale influences these formats. Know how the various number formatters (currency, percent, compact) differ. Be able to write a custom date or number formatter using symbols, including how to escape literal values.

Determine which resource bundle Java will use to look up a key. Be able to create resource bundles for a set of locales using properties files. Know the search order that Java uses to select a resource bundle and how the default locale and default resource bundle are considered. Once a resource bundle is found, recognize the hierarchy used to select values.

Review Questions

The answers to the chapter review questions can be found in the Appendix.

1. Which of the following can be inserted on line 8 to make this code compile? (Choose all that apply.)

```
7: public void whatHappensNext() throws IOException {
8:   // INSERT CODE HERE
9: }
```

A. System.out.println("it's ok");

B. throw new Exception();

C. throw new IllegalArgumentException();

D. throw new java.io.IOException();

E. throw new RuntimeException();

F. None of the above

2. Which statement about the following class is correct?

```
1: class Problem extends Exception {
2:   public Problem() {}
3: }
4: class YesProblem extends Problem {}
5: public class MyDatabase {
6:   public static void connectToDatabase() throw Problem {
7:     throws new YesProblem();
8:   }
9:   public static void main(String[] c) throw Exception {
10:    connectToDatabase();
11:  }
12: }
```

A. The code compiles and prints a stack trace for YesProblem at runtime.

B. The code compiles and prints a stack trace for Problem at runtime.

C. The code does not compile because Problem defines a constructor.

D. The code does not compile because YesProblem does not define a constructor.

E. The code does not compile but would if Problem and YesProblem were switched on lines 6 and 7.

F. None of the above

3. Which of the following are common types to localize? (Choose all that apply.)

A. Dates

B. Lambda expressions

C. Class names

D. Currency

E. Numbers

F. Variable names

4. What is the output of the following snippet, assuming a and b are both 0?

```
3: try {
4:    System.out.print(a / b);
5: } catch (RuntimeException e) {
6:    System.out.print(-1);
7: } catch (ArithmeticException e) {
8:    System.out.print(0);
9: } finally {
10:   System.out.print("done");
11: }
```

A. -1

B. 0

C. done-1

D. done0

E. The code does not compile.

F. An uncaught exception is thrown.

G. None of the above

5. Assuming the current locale uses dollars ($) and the following method is called with a double value of 100_102.2, which of the following values are printed? (Choose all that apply.)

```
public void print(double t) {

System.out.print(NumberFormat.getCompactNumberInstance().format(
t));

  System.out.print(
    NumberFormat.getCompactNumberInstance(
      Locale.getDefault(), Style.SHORT).format(t));

  System.out.print(NumberFormat.getCurrencyInstance().format(t));
}
```

A. 100

B. $100,000.00

C. 100K

D. 100 thousand

E. 100M

F. $100,102.20

G. None of the above

6. What is the output of the following code?

```
LocalDate date = LocalDate.parse("2022-04-30",
  DateTimeFormatter.ISO_LOCAL_DATE_TIME);
System.out.println(date.getYear() + " "
  + date.getMonth() + " "+ date.getDayOfMonth());
```

A. 2022 APRIL 2

B. 2022 APRIL 30

C. 2022 MAY 2

D. The code does not compile.

E. A runtime exception is thrown.

7. What does the following method print?

```
11: public void tryAgain(String s) {
12:   try (FileReader r = null, p = new FileReader("")) {
13:     System.out.print("X");
14:     throw new IllegalArgumentException();
15:   } catch (Exception s) {
16:     System.out.print("A");
17:     throw new FileNotFoundException();
18:   } finally {
19:     System.out.print("O");
```

```
20:   }
21: }
```

A. XAO

B. XOA

C. One line of this method contains a compiler error.

D. Two lines of this method contain compiler errors.

E. Three or more lines of this method contain compiler errors.

F. The code compiles, but a NullPointerException is thrown at runtime.

G. None of the above

8. Assume that all of the files mentioned in the answer choices exist and define the same keys. Which one will be used to find the key in line 8?

```
6: Locale.setDefault(new Locale("en", "US"));
7: var b = ResourceBundle.getBundle("Dolphins");
8: System.out.println(b.getString("name"));
```

A. Dolphins.properties

B. Dolphins_US.properties

C. Dolphins_en.properties

D. Whales.properties

E. Whales_en_US.properties

F. The code does not compile.

9. For what value of pattern will the following print <005.21> <008.49> <1,234.0>?

```
String pattern = "_________________";
var message = DoubleStream.of(5.21, 8.49, 1234)
  .mapToObj(v -> new DecimalFormat(pattern).format(v))
  .collect(Collectors.joining("> <"));
System.out.println("<"+message+">");
```

A. ##.#

B. 0,000.0#

C. #,###.0

D. #,###,000.0#

E. The code does not compile regardless of what is placed in the blank.

F. None of the above

10. Which scenario is the best use of an exception?

A. An element is not found when searching a list.

B. An unexpected parameter is passed into a method.

C. The computer caught fire.

D. You want to loop through a list.

E. You don't know how to code a method.

11. Which of the following exceptions must be handled or declared in the method in which they are thrown? (Choose all that apply.)

```
class Apple extends RuntimeException {}
class Orange extends Exception {}
class Banana extends Error {}
class Pear extends Apple {}
class Tomato extends Orange {}
class Peach extends Throwable {}
```

A. Apple

B. Orange

C. Banana

D. Pear

E. Tomato

F. Peach

12. Which of the following changes, when made independently, would make this code compile? (Choose all that apply.)

```
1:  import java.io.*;
2:  public class StuckTurkeyCage implements AutoCloseable {
3:    public void close() throws IOException {
4:      throw new FileNotFoundException("Cage not closed");
5:    }
6:    public static void main(String[] args) {
7:      try (StuckTurkeyCage t = new StuckTurkeyCage()) {
8:        System.out.println("put turkeys in");
9:      }
10:   } }
```

A. Remove throws IOException from the declaration on line 3.

B. Add throws Exception to the declaration on line 6.

C. Change line 9 to } catch (Exception e) {}.

D. Change line 9 to } finally {}.

E. The code compiles as is.

F. None of the above

13. Which of the following are true statements about exception handling in Java? (Choose all that apply.)

A. A traditional try statement without a catch block requires a finally block.

B. A traditional try statement without a finally block requires a catch block.

C. A traditional try statement with only one statement can omit the {}.

D. A try-with-resources statement without a catch block requires a finally block.

E. A try-with-resources statement without a finally block requires a catch block.

F. A try-with-resources statement with only one statement can omit the {}.

14. Assuming -g:vars is used when the code is compiled to include debug information, what is the output of the following code snippet?

```
var huey = (String)null;
Integer dewey = null;
Object louie = null;
if(louie == huey.substring(dewey.intValue())) {
  System.out.println("Quack!");
}
```

A. A NullPointerException that does not include any variable names in the stack trace

B. A NullPointerException naming huey in the stack trace

C. A NullPointerException naming dewey in the stack trace

D. A NullPointerException naming louie in the stack trace

E. A NullPointerException naming huey and louie in the stack trace

F. A NullPointerException naming huey and dewey in the stack trace

G. None of the above

15. Which of the following, when inserted independently in the blank, use locale parameters that are properly formatted? (Choose all that apply.)

```
import java.util.Locale;
public class ReadMap implements AutoCloseable {
```

```
  private Locale locale;
  private boolean closed = false;
  @Override public void close() {
    System.out.println("Folding map");
    locale = null;
    closed = true;
  }
  public void open() {
    this.locale = _____;
  }
  public void use() {
    // Implementation omitted
  }
}
```

A. new Locale("xM")

B. new Locale("MQ", "ks")

C. new Locale("qw")

D. new Locale("wp", "VW")

E. Locale.create("zp")

F. new Locale.Builder().setLanguage("yw").setRegion("PM")

G. The code does not compile regardless of what is placed in the blank.

16. Which of the following can be inserted into the blank to allow the code to compile and run without throwing an exception? (Choose all that apply.)

```
var f = DateTimeFormatter.ofPattern("hh o'clock");
System.out.println(f.format(_____.now()));
```

A. ZonedDateTime

B. LocalDate

C. LocalDateTime

D. LocalTime

E. The code does not compile regardless of what is placed in the blank.

F. None of the above

17. Which of the following statements about resource bundles are correct? (Choose all that apply.)

A. All keys must be in the same resource bundle to be used.

B. A resource bundle is loaded by calling the new ResourceBundle() constructor.

C. Resource bundle values are always read using the Properties class.

D. Changing the default locale lasts for only a single run of the program.

E. If a resource bundle for a specific locale is requested, then the resource bundle for the default locale will not be used.

F. It is possible to use a resource bundle for a locale without specifying a default locale.

18. What is the output of the following code?

```
import java.io.*;
public class FamilyCar {
  static class Door implements AutoCloseable {
    public void close() {
      System.out.print("D");
  } }
  static class Window implements Closeable {
    public void close() {
      System.out.print("W");
      throw new RuntimeException();
  } }
  public static void main(String[] args) {
    var d = new Door();
    try (d; var w = new Window()) {
      System.out.print("T");
    } catch (Exception e) {
      System.out.print("E");
    } finally {
      System.out.print("F");
    } } }
```

A. TWF

B. TWDF

C. TWDEF

D. TWF followed by an exception

E. TWDF followed by an exception

F. TWEF followed by an exception

G. The code does not compile.

19. Suppose that we have the following three properties files and code. Which bundles are used on lines 8 and 9, respectively?

Dolphins.properties

```
name=The Dolphin
age=0
```

Dolphins_en.properties

```
name=Dolly
age=4
```

Dolphins_fr.properties

```
name=Dolly
```

```
5: var fr = new Locale("fr");
6: Locale.setDefault(new Locale("en", "US"));
7: var b = ResourceBundle.getBundle("Dolphins", fr);
8: b.getString("name");
9: b.getString("age");
```

A. Dolphins.properties and Dolphins.properties

B. Dolphins.properties and Dolphins_en.properties

C. Dolphins_en.properties and Dolphins_en.properties

D. Dolphins_fr.properties and Dolphins.properties

E. Dolphins_fr.properties and Dolphins_en.properties

F. The code does not compile.

G. None of the above

20. What is printed by the following program?

```
1:  public class DriveBus {
2:    public void go() {
3:      System.out.print("A");
4:      try {
5:        stop();
6:      } catch (ArithmeticException e) {
7:        System.out.print("B");
8:      } finally {
9:        System.out.print("C");
10:     }
11:     System.out.print("D");
12:   }
13:   public void stop() {
14:     System.out.print("E");
15:     Object x = null;
16:     x.toString();
17:     System.out.print("F");
18:   }
19:   public static void main(String n[]) {
20:     new DriveBus().go();
21:   } }
```

A. AE

B. AEBCD

C. AEC

D. AECD

E. AE followed by a stack trace

F. AEBCD followed by a stack trace

G. AEC followed by a stack trace

H. A stack trace with no other output

21. Which changes, when made independently, allow the following program to compile? (Choose all that apply.)

```
1: public class AhChoo {
2:   static class SneezeException extends Exception {}
3:   static class SniffleException extends SneezeException {}
4:   public static void main(String[] args) {
5:     try {
6:       throw new SneezeException();
7:     } catch (SneezeException | SniffleException e) {
8:     } finally {}
9:   } }
```

A. Add throws SneezeException to the declaration on line 4.

B. Add throws Throwable to the declaration on line 4.

C. Change line 7 to } catch (SneezeException e) {.

D. Change line 7 to } catch (SniffleException e) {.

E. Remove line 7.

F. The code compiles correctly as is.

G. None of the above

22. What is the output of the following code?

```
try {
  LocalDateTime book = LocalDateTime.of(2022, 4, 5, 12, 30, 20);
  System.out.print(book.format(DateTimeFormatter.ofPattern("m")));
  System.out.print(book.format(DateTimeFormatter.ofPattern("z")));
  System.out.print(DateTimeFormatter.ofPattern("y").format(book));
} catch (Throwable e) {}
```

A. 4

B. 30

C. 402

D. 3002

E. 3002022

F. 402022

G. None of the above

23. Fill in the blank: A class that implements _____ may be in a try-with-resources statement. (Choose all that apply.)

A. AutoCloseable

B. Resource

C. Exception

D. AutomaticResource

E. Closeable

F. RuntimeException

G. Serializable

24. What is the output of the following program?

```
public class SnowStorm {
 static class WalkToSchool implements AutoCloseable {
  public void close() {
   throw new RuntimeException("flurry");
  } }
 public static void main(String[] args) {
  WalkToSchool walk1 = new WalkToSchool();
  try (walk1; WalkToSchool walk2 = new WalkToSchool()) {
   throw new RuntimeException("blizzard");
  } catch(Exception e) {
   System.out.println(e.getMessage()
    + " " + e.getSuppressed().length);
  }
  walk1 = null;
 } }
```

A. blizzard 0

B. blizzard 1

C. blizzard 2

D. flurry 0

E. flurry 1

F. flurry 2

G. None of the above

25. Assuming U.S. currency is in dollars ($) and German currency is in euros (€), what is the output of the following program?

```
import java.text.NumberFormat;
import java.util.Locale;
import java.util.Locale.Category;
public record Wallet(double money) {
  private String openWallet() {
    Locale.setDefault(Category.DISPLAY,
      new Locale.Builder().setRegion("us").build());
    Locale.setDefault(Category.FORMAT,
      new Locale.Builder().setLanguage("en").build());
    return NumberFormat.getCurrencyInstance(Locale.GERMANY)
      .format(money);
  }
  public void printBalance() {
    System.out.println(openWallet());
  }
  public static void main(String... unused) {
    new Wallet(2.4).printBalance();
  } }
```

A. 2,40 €

B. $2.40

C. 2.4

D. The code does not compile.

E. None of the above

26. Which lines can fill in the blank to make the following code compile? (Choose all that apply.)

```
void rollOut() throws ClassCastException {}

public void transform(String c) {
  try {
    rollOut();
  } catch (IllegalArgumentException | _____) {
  }
}
```

A. IOException a

B. Error b

C. NullPointerException c

D. RuntimeException d

E. NumberFormatException e

F. ClassCastException f

G. None of the above. The code contains a compiler error regardless of what is inserted into the blank.