Part 1 – Dr King Book
Exercises 1 – 12
pp 122 - 124
1. Suppose that we decide to model a soft-drink can as an object.

   a) List three significant items that will be part of the state of a soft-drink can.
   b) List three significant operations on a soft-drink can.
1. Answer

a) capacity, volume, contents
b) open, sip, dispose

There are many possible answers to this question.
2. Write a declaration for the BallpointPen class, using the variable names and method names mentioned in Section 3.2. Leave the bodies of the methods empty.
3. Write a declaration for the Car class, using the variable names and method names mentioned in Section 3.2. Leave the bodies of the methods empty.
3. Answer:

```java
public class Car {
    private boolean engineIsOn;
    private double fuelRemaining;

    // constructor
    public Car(boolean initialOn, double initialFuel) {
        // constructor code
    }

    // getter methods
    public boolean getEngineIsOn() {
        // getter code
    }

    public double getFuelRemaining() {
        // getter code
    }

    // setter methods
    public void setEngineIsOn(boolean onOrOff) {
        // setter code
    }

    public void setFuelRemaining(double fuel) {
        // setter code
    }

    // other methods
    public void startEngine() {
        // method code
    }

    public void drive(double distance); // will use fixed mpg to reduce fuel
    public void addFuel(double amount)
}
```
4. Locate the error in the following Java declaration and show how to fix it.

    Account acct = Account(100.00);
4. Answer

The word new is missing.

Account acct = new Account(100.00);
5. Assume that pen is a BallpointPen object. Using the class declaration from Exercise 2, write statements that perform the following operations on a pen.

a. Press the button belonging to pen.
b. Write for 200 units using pen.
c. Replace pen's cartridge.
d. Determine how much ink remains in pen, and store that number into a double variable named inkLeft.
5. Answer

a. pen.pressButton();
b. pen.write(200);
c. pen.replaceCartridge();
d. double inkLeft = pen.getInkRemaining();
6. Assume that car is a Car object. Using the class declaration from Exercise 3, write statements that perform the following operations on car.

a. Start car's engine.
b. Drive car for 120 miles.
c. Add 9.3 gallons to car's tank.
d. Stop car's engine.
6. Answer

a. car.startEngine();
b. car.drive(120);
c. car.addFuel(9.3);
d. car.setEngineIsOn(false);
7. The following questions refer to the class on the next slide.
   a. How many constructors does the class have?
   b. How many methods does the class have?
   c. Write a declaration that declares a Counter variable named ctr and initializes it to contain a Counter object that contains the number 0.
   d. Write a statement that increments the value stored in the ctr object.
   e. Write a statement that changes the value stored in the ctr object to zero.
   f. Write a statement that prints the value stored in the ctr object.
class Counter {
    private int count;

    public Counter(int initialCount) {
        count = initialCount;
    }

    public Counter() {
        count = 0;
    }

    public void increment() {
        count += 1;
    }

    public void reset() {
        count = 0;
    }

    public int getValue() {
        return count;
    }
}

7. Answer

a. 2 constructors
b. 3 methods
c. Counter ctr = new Counter(0);
d. ctr.increment();
e. ctr.reset();
f. System.out.println(ctr.getValue());
8. What balance will be stored in acct1, acct2, and acct3 after the following statements have been executed?

Account acct1 = new Account(500.00);
Account acct2 = new Account(1000.00);
Account acct3 = acct1;

acct1.deposit(500.00);
acct2.withdraw(250.00);
acct3.deposit(100.00);
8. Answer

acct1 and acct3 are both 1100.00
acct2 is 750.00
9. After the following statements are executed, how many account objects will exist, not counting garbage objects?

Account acct1 = new Account();
Account acct2 = new Account();
Account acct3 = acct1;
acct2 = acct3;
acct1 = null;

acct2 = acct3;
acct1 = null;
9. Answer

Only 1
10. Suppose that word is a String variable containing a single word. Write a statement that will capitalize the first letter of the word, leaving all other letters unchanged.
10. Answer

```java
word = word.substring(0,1).toUpperCase() + word.substring(1,word.length());
```
11. Write a series of statements that split up an email address named emailAddress. Assume that the form `name@domain2.domain1` is used.

Store name, domain2 and domain1 in variables with those names.

For example, if the emailAddress is `knking@gsu.edu`, name would be “knking”, domain2 would be “gsu” and domain1 would become “edu”.
11. Answer

```java
int dotPosition = emailAddress.indexOf(".");
int atPosition = emailAddress.indexOf("@");
String name = 
    emailAddress.substring(0,atPosition);
String domain1 = 
    emailAddress.substring(atPosition+1,dotPosition);
String domain2 = 
    emailAddress.substring( 
        dotPosition+1,emailAddress.length());
```
12. Show the output of the following program.

```java
public class Exercise3_12 {

    public static void main(String[] args) {
        String name = "Francis Albert Sinatra";
        int index1 = name.indexOf(" ");
        int index2 = name.lastIndexOf(" ");
        String str1 = name.substring(0, index1);
        String str2 = name.substring(index1 + 1, index1 + 2);
        String str3 = name.substring(index2 + 1);
        System.out.println(str3 + ", " + str1 + " " + str2 + ".");
    }
}
```
12. Answer

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Part 2 – Number Conversion Sample Problems
Q 1. Given our discussion of positional numbering systems in Section 4.2.1, see whether you can determine the decimal value of the following numbers:

133 (base 4)

367 (base 8, also called octal)

1BA (base 16, also called hexadecimal. B is the digit that represents 11; A is the digit that represents 10.)
Q 1 Answers

133 (base 4) is \((1 \times 16) + (3 \times 4) + (3 \times 1) = 31\) in decimal

367 (base 8) is \((3 \times 64) + (6 \times 8) + (7 \times 1) = 247\) in decimal

1BA (base 16) = \((256 \times 1) + (16 \times 11) + (1 \times 10) = 442\)
Q2. Determine the decimal value of the following unsigned binary numbers:

11000
110001
1111111
1000000000
Q2. Answer

11000 = 16 + 8 = 24
110001 = 32 + 16 + 1 = 49
1111111 = 64 + 32 + 16 + 8 + 4 + 2 + 1 = 127
1000000000 = 512
Q3. Using n = 5 bits, give two's complement representation of

(a) 12
(b) -12
(c) 9
(d) -3

and perform

(e) 12 + -12
(f) -12 + 9
(g) 12 + -3.
Q3. Answers

(a) 12 = 01100
(b) -12 = 10100
(c) 9 = 01001
(d) -3 = 11101

and perform

(e) 12 + -12 01100 + 10100 = 00000 (0)
(f) -12 + 9 10100 + 01001 = 11101 (-3)
(g) 12 + -3 01100 + 11101 = 01001 (9)