

4.1 What will be the result of attempting to compile this code?

```
import java.util.*;
package com.acme.toolkit;
public class AClass {
    public Other anInstance;
}
class Other {
    int value;
}
```

Select the one correct answer.

- (a) The code will fail to compile, since the class Other has not yet been declared when referenced in the class AClass.
- (b) The code will fail to compile, since an import statement cannot occur as the first statement in a source file.
- (c) The code will fail to compile, since the package declaration cannot occur after an import statement.
- (d) The code will fail to compile, since the class Other must be defined in a file called Other.java.
- (e) The code will fail to compile, since the class Other must be declared public.
- (f) The class will compile without errors.

4.2 Given the following code:

```
// (1) INSERT ONE IMPORT STATEMENT HERE
public class RQ700_20 {
    public static void main(String[] args) {
        System.out.println(sqrt(49));
    }
}
```

Which statements, when inserted at (1), will result in a program that prints 7, when compiled and run?

Select the two correct answers.

- (a) `import static Math.*;`
- (b) `import static Math.sqrt;`
- (c) `import static java.lang.Math.sqrt;`
- (d) `import static java.lang.Math.sqrt();`
- (e) `import static java.lang.Math.*;`

4.3 Given the following code:

```
// (1) INSERT ONE IMPORT STATEMENT HERE
public class RQ700_10 {
    public static void main(String[] args) {
        System.out.println(Locale.UK); // Locale string for UK is "en_GB".
    }
}
```

Which statements, when inserted at (1), will result in a program that prints en_GB, when compiled and run?

Select the two correct answers.

- (a) `import java.util.*;`
- (b) `import java.util.Locale;`
- (c) `import java.util.Locale.UK;`
- (d) `import java.util.Locale.*;`
- (e) `import static java.util.*;`
- (f) `import static java.util.Locale;`
- (g) `import static java.util.Locale.UK;`
- (h) `import static java.util.Locale.*;`

4.4 Given the following code:

```
package p1;
enum Signal {
    GET_SET, ON_YOUR_MARKS, GO;
}
-----
package p2;
// (1) INSERT IMPORT STATEMENT(S) HERE
public class RQ700_50 {
    public static void main(String[] args) {
        for(Signal sign : Signal.values()) {
            System.out.println(sign);
        }
    }
}
```

Which import statement(s), when inserted at (1), will result in a program that prints the constants of the enum type Signal, when compiled and run?

Select the one correct answer.

- (a) `import static p1.Signal.*;`
- (b) `import p1.Signal;`
- (c) `import p1.*;`
- (d) `import p1.Signal; import static p1.Signal.*;`
- (e) `import p1.*; import static p1.*;`
- (f) None of the above.

4.5 Given the following code:

```
package p3;
public class Util {
    public enum Format {
        JPEG { public String toString() {return "Jpeggy"; }},
        GIF { public String toString() {return "Giffy"; }},
        TIFF { public String toString() {return "Tiffy"; }};
    }
    public static <T> void print(T t) {
        System.out.print("|" + t + "|");
    }
}
```

```
-----
// (1) INSERT IMPORT STATEMENTS HERE
public class NestedImportsA {
    public static void main(String[] args) {
        Util u = new Util();
        Format[] formats = {
            GIF, TIFF,
            JPEG,
            Format.JPEG,
            Util.Format.JPEG,
            p3.Util.Format.JPEG
        };
        for (Format fmt : formats)
            print(fmt);
    }
}
```

Which sequence of import statements, when inserted at (1), will result in the code compiling, and the execution of the main() method printing:

|Giffy| |Tiffy| |Jpeggy| |Jpeggy| |Jpeggy| |Jpeggy|

Select the three correct answers.

- (a)

```
import p3.Util;
import p3.Util.Format;
import static p3.Util.print;
import static p3.Util.Format.*;
```
- (b)

```
import p3.Util;
import static p3.Util.Format;
import static p3.Util.print;
import static p3.Util.Format.*;
```
- (c)

```
import p3.*;
import static p3.Util.*;
import static p3.Util.Format.*;
```
- (d)

```
import p3.*;
import p3.Util.*;
import static p3.Util.Format.*;
```

4.6 Which statements are true about the import statement?

Select the two correct answers.

- (a) Static import from a class automatically imports names of static members of any nested types declared in that class.
- (b) Static members of the default package cannot be imported.
- (c) Static import statements must be specified after any type import statements.
- (d) In the case of a name conflict, the name in the last static import statement is chosen.
- (e) A declaration of a name in a compilation unit can shadow a name that is imported.

4.7 Given the source file A.java:

```
package top.sub;
public class A {}
```

And the following directory hierarchy:

```
/proj
|--- src
|   |--- top
|   |   |--- sub
|   |   |   |--- A.java
|--- bin
```

Assuming that the current directory is `/proj/src`, which of the following statements are true?

Select the three correct answers.

- (a) The following command will compile, and place the file `A.class` under `/proj/bin`:
`javac -d . top/sub/A.java`
- (b) The following command will compile, and place the file `A.class` under `/proj/bin`:
`javac -d /proj/bin top/sub/A.java`
- (c) The following command will compile, and place the file `A.class` under `/proj/bin`:
`javac -D /proj/bin ./top/sub/A.java`
- (d) The following command will compile, and place the file `A.class` under `/proj/bin`:
`javac -d ../bin top/sub/A.java`
- (e) After successful compilation, the absolute pathname of the file `A.class` will be:
`/proj/bin/A.class`
- (f) After successful compilation, the absolute pathname of the file `A.class` will be:
`/proj/bin/top/sub/A.class`

4.8 Given the following directory structure:

```
/top
|--- wrk
|   |--- pkg
|   |   |--- A.java
|   |   |--- B.java
```

Assume that the two files `A.java` and `B.java` contain the following code, respectively:

```
// Filename: A.java
package pkg;
class A { B b; }
// Filename: B.java
package pkg;
class B {...}
```

For which combinations of current directory and command is the compilation successful?

Select the two correct answers.

- (a) Current directory: `/top/wrk`
Command: `javac -cp .:pkg A.java`
- (b) Current directory: `/top/wrk`
Command: `javac -cp . pkg/A.java`
- (c) Current directory: `/top/wrk`
Command: `javac -cp pkg A.java`
- (d) Current directory: `/top/wrk`
Command: `javac -cp .:pkg pkg/A.java`
- (e) Current directory: `/top/wrk/pkg`
Command: `javac A.java`
- (f) Current directory: `/top/wrk/pkg`
Command: `javac -cp . A.java`

4.9 Given the following directory structure:

```
/proj
|--- src
|   |--- A.class
|
|--- bin
|   |--- top
|   |   |--- sub
|   |   |   |--- A.class
```

Assume that the current directory is `/proj/src`. Which classpath specifications will find the file `A.class` for the class `top.sub.A`?

Select the two correct answers.

- (a) `-cp /top/bin/top`
- (b) `-cp /top/bin/top/sub`
- (c) `-cp /top/bin/top/sub/A.class`
- (d) `-cp ../bin; .`
- (e) `-cp /top`
- (f) `-cp /top/bin`

4.10 Given that the name of the class MyClass is specified correctly, which commands are syntactically valid:

Select the two correct answers.

- (a) java -Ddebug=true MyClass
- (b) java -ddebug=true MyClass
- (c) java -Ddebug="true" MyClass
- (d) java -D debug=true MyClass

4.11 Which statement is true?

Select the one correct answer.

- (a) A JAR file can only contain one package.
- (b) A JAR file can only be specified for use with the java command, in order to run a program.
- (c) The classpath definition of the platform overrides any entries specified in the classpath option.
- (d) The -d option is used with the java command, and the -D is used with the javac command.
- (e) None of the above statements are true.

4.12 Given the following class, which of these alternatives are valid ways of referring to the class from outside of the package net.basemaster?

```
package net.basemaster;
public class Base {
    // ...
}
```

Select the two correct answers.

- (a) By simply referring to the class as Base.
- (b) By simply referring to the class as basemaster.Base.
- (c) By simply referring to the class as net.basemaster.Base.
- (d) By importing with net.basemaster.*, and referring to the class as Base.
- (e) By importing with net.*, and referring to the class as basemaster.Base.

4.13 Which one of the following class declarations is a valid declaration of a class that cannot be instantiated?

Select the one correct answer.

- (a) class Ghost { abstract void haunt(); }
- (b) abstract class Ghost { void haunt(); }
- (c) abstract class Ghost { void haunt() {};
- (d) abstract Ghost { abstract void haunt(); }
- (e) static class Ghost { abstract haunt(); }

4.14 Which one of the following class declarations is a valid declaration of a class that cannot be extended?

Select the one correct answer.

- (a) class Link { }
- (b) abstract class Link { }
- (c) native class Link { }
- (d) static class Link { }
- (e) final class Link { }
- (f) private class Link { }
- (g) abstract final class Link { }

4.15 Given the following declaration of a class, which fields are accessible from outside the package com.corporation.project?

```
package com.corporation.project;
public class MyClass {
    int i;
    public int j;
    protected int k;
    private int l;
}
```

Select the two correct answers.

- (a) Field i is accessible in all classes in other packages.
- (b) Field j is accessible in all classes in other packages.
- (c) Field k is accessible in all classes in other packages.
- (d) Field k is accessible in subclasses only in other packages.
- (e) Field l is accessible in all classes in other packages.
- (f) Field l is accessible in subclasses only in other packages.

4.16 How restrictive is the default accessibility compared to public, protected, and private accessibility?

Select the one correct answer.

- (a) Less restrictive than public.
- (b) More restrictive than public, but less restrictive than protected.
- (c) More restrictive than protected, but less restrictive than private.
- (d) More restrictive than private.
- (e) Less restrictive than protected from within a package, and more restrictive than protected from outside a package.

4.17 Which statement is true about the accessibility of members?

Select the one correct answer.

- (a) A private member is always accessible within the same package.
- (b) A private member can only be accessed within the class of the member.
- (c) A member with default accessibility can be accessed by any subclass of the class in which it is declared.
- (d) A private member cannot be accessed at all.
- (e) Package/default accessibility for a member can be declared using the keyword default.

4.18 Which lines that are marked will compile in the following code?

```
//Filename: A.java
package packageA;
public class A {
    protected int pf;
}
//Filename: B.java
package packageB;
import packageA.A;
public class B extends A {
    void action(A obj1, B obj2, C obj3) {
        pf = 10; // (1)
        obj1.pf = 10; // (2)
        obj2.pf = 10; // (3)
        obj3.pf = 10; // (4)
    }
}
```

```

class C extends B {
    void action(A obj1, B obj2, C obj3) {
        pf = 10;           // (5)
        obj1.pf = 10;      // (6)
        obj2.pf = 10;      // (7)
        obj3.pf = 10;      // (8)
    }
}
class D {
    void action(A obj1, B obj2, C obj3) {
        pf = 10;           // (9)
        obj1.pf = 10;      // (10)
        obj2.pf = 10;      // (11)
        obj3.pf = 10;      // (12)
    }
}

```

Select the five correct answers.

- (a) (1)
- (b) (2)
- (c) (3)
- (d) (4)
- (e) (5)
- (f) (6)
- (g) (7)
- (h) (8)
- (i) (9)
- (j) (10)
- (k) (11)
- (l) (12)

4.19 Which statements about the use of modifiers are true?

Select the two correct answers.

- (a) If no accessibility modifier (public, protected, or private) is specified for a member declaration, the member is only accessible by classes in the package of its class and by subclasses of its class in any package.
- (b) You cannot specify accessibility of local variables. They are only accessible within the block in which they are declared.
- (c) Subclasses of a class must reside in the same package as the class they extend.
- (d) Local variables can be declared static.
- (e) The objects themselves do not have any accessibility modifiers, only the object references do.

4.20 Given the following source code, which comment line can be uncommented without introducing errors?

```

abstract class MyClass {
    abstract void f();
    final void g() {}
    //final void h() {}           // (1)
    protected static int i;
    private int j;
}
final class MyOtherClass extends MyClass {
    //MyOtherClass(int n) { m = n; } // (2)
    public static void main(String[] args) {
        MyClass mc = new MyOtherClass();
    }
    void f() {}
    void h() {}
    //void k() { i++; }           // (3)
    //void l() { j++; }           // (4)
    int m;
}

```

Select the one correct answer.

- (a) (1)
- (b) (2)
- (c) (3)
- (d) (4)

4.21 What would be the result of compiling and running the following program?

```

class MyClass {
    static MyClass ref;
    String[] arguments;
    public static void main(String[] args) {
        ref = new MyClass();
        ref.func(args);
    }
    public void func(String[] args) {
        ref.arguments = args;
    }
}

```

Select the one correct answer.

- (a) The program will fail to compile, since the static method main() cannot have a call to the non-static method func().
- (b) The program will fail to compile, since the non-static method func() cannot access the static variable ref.
- (c) The program will fail to compile, since the argument args passed to the static method main() cannot be passed to the non-static method func().
- (d) The program will compile, but will throw an exception when run.
- (e) The program will compile and run successfully.

4.22 Given the following member declarations, which statement is true?

```

int a;           // (1)
static int a;    // (2)
int f() { return a; } // (3)
static int f() { return a; } // (4)

```

Select the one correct answer.

- (a) Declarations (1) and (3) cannot occur in the same class declaration.
- (b) Declarations (2) and (4) cannot occur in the same class declaration.
- (c) Declarations (1) and (4) cannot occur in the same class declaration.
- (d) Declarations (2) and (3) cannot occur in the same class declaration.

4.23 Which statement is true?

Select the one correct answer.

- (a) A static method can call other non-static methods in the same class by using the this keyword.
- (b) A class may contain both static and non-static variables, and both static and non-static methods.
- (c) Each object of a class has its own instance of the static variables declared in the class.
- (d) Instance methods may access local variables of static methods.
- (e) All methods in a class are implicitly passed the this reference as argument, when invoked.

5.1 Given the following declaration:

```
char c = 'A';
```

What is the simplest way to convert the character value in c into an int?

Select the one correct answer.

- (a) `int i = c;`
- (b) `int i = (int) c;`
- (c) `int i = Character.getNumericValue(c);`

5.2 What will be the result of compiling and running the following program?

```
public class Assignment {
    public static void main(String[] args) {
        int a, b, c;
        b = 10;
        a = b = c = 20;
        System.out.println(a);
    }
}
```

Select the one correct answer.

- (a) The program will fail to compile since the compiler will report that the variable c in the multiple assignment statement `a = b = c = 20;` has not been initialized.
- (b) The program will fail to compile, because the multiple assignment statement `a = b = c = 20;` is illegal.
- (c) The code will compile and print 10, when run.
- (d) The code will compile and print 20, when run.

5.3 What will be the result of compiling and running the following program?

```
public class MyClass {
    public static void main(String[] args) {
        String a, b, c;
        c = new String("mouse");
        a = new String("cat");
        b = a;
        a = new String("dog");
        c = b;
        System.out.println(c);
    }
}
```

Select the one correct answer.

- (a) The program will fail to compile.
- (b) The program will print mouse, when run.
- (c) The program will print cat, when run.
- (d) The program will print dog, when run.
- (e) The program will randomly print either cat or dog, when run.

5.4 Which of the following expressions will be evaluated using floating-point arithmetic?

Select the three correct answers.

- (a) `2.0 * 3.0`
- (b) `2 * 3`
- (c) `2/3 + 5/7`
- (d) `2.4 + 1.6`
- (e) `0x10 * 1L * 300.0`

5.5 What is the value of the expression $(1 / 2 + 3 / 2 + 0.1)$?

Select the one correct answer.

- (a) 1 (b) 1.1 (c) 1.6 (d) 2 (e) 2.1

5.6 What will be the result of compiling and running the following program?

```
public class Integers {
    public static void main(String[] args) {
        System.out.println(0x10 + 10 + 010);
    }
}
```

Select the one correct answer.

- (a) The program will not compile because of errors in the expression `0x10 + 10 + 010`.
- (b) When run, the program will print 28.
- (c) When run, the program will print 30.
- (d) When run, the program will print 34.
- (e) When run, the program will print 36.
- (f) When run, the program will print 101010.

5.7 Which of the following expressions are valid?

Select the three correct answers.

- (a) `(- 1 -)` (b) `(+ + 1)` (c) `(+--+ -1)` (d) `(--1)` (e) `(1 * * 1)` (f) `(- -1)`

5.8 What is the value of evaluating the following expression $(- -1-3 * 10 / 5-1)$?

Select the one correct answer.

- (a) -8 (b) -6 (c) 7 (d) 8 (e) 10 (f) None of the above.

5.9 Which of these assignments are valid?

Select the four correct answers.

- (a) `short s = 12;`
- (b) `long l = 012;`
- (c) `int other = (int) true;`
- (d) `float f = -123;`
- (e) `double d = 0x12345678;`

5.10 Which statements are true?

Select the three correct answers.

- (a) The expression `(1 + 2 + "3")` evaluates to the string "33".
- (b) The expression `("1" + 2 + 3)` evaluates to the string "15".
- (c) The expression `(4 + 1.0f)` evaluates to the float value 5.0f.
- (d) The expression `(10/9)` evaluates to the int value 1.
- (e) The expression `('a' + 1)` evaluates to the char value 'b'.

5.11 What happens when you try to compile and run the following program?

```
public class Prog1 {
    public static void main(String[] args) {
        int k = 1;
        int i = ++k + k++ + + k; // (1)
        System.out.println(i);
    }
}
```

Select the one correct answer.

- (a) The program will not compile, because of errors in the expression at (1).
- (b) The program will compile and print the value 3, when run.
- (c) The program will compile and print the value 4, when run.
- (d) The program will compile and print the value 7, when run.
- (e) The program will compile and print the value 8, when run.

5.12 What is the label of the first line that will cause a compile time error in the following program?

```
public class MyClass {
    public static void main(String[] args) {
        char c;
        int i;
        c = 'a'; // (1)
        i = c; // (2)
        i++; // (3)
        c = i; // (4)
        c++; // (5)
    }
}
```

Select the one correct answer.

- (a) (1) (b) (2) (c) (3) (d) (4) (e) (5)
(f) None of the above. The compiler will not report any errors.

5.13 What is the result of compiling and running the following program?

```
public class Cast {
    public static void main(String[] args) {
        byte b = 128;
        int i = b;
        System.out.println(i);
    }
}
```

Select the one correct answer.

- (a) The program will not compile because a byte value cannot be assigned to an int variable without using a cast.
(b) The program will compile and print 128, when run.
(c) The program will not compile because the value 128 is not in the range of values for the byte type.
(d) The program will compile but will throw a ClassCastException when run.
(e) The program will compile and print 255, when run.

5.14 What will be the result of compiling and running the following program?

```
public class EvaluationOrder {
    public static void main(String[] args) {
        int[] array = { 4, 8, 16 };
        int i=1;
        array[++i] = --i;
        System.out.println(array[0] + array[1] + array[2]);
    }
}
```

Select the one correct answer.

- (a) 13 (b) 14 (c) 20 (d) 21 (e) 24

5.15 Which of the following expressions evaluate to true?

Select the two correct answers.

- (a) (false | true) (b) (null != null) (c) (4 <= 4)
(d) (!true) (e) (true & false)

5.16 Which statements are true?

Select the two correct answers.

- (a) The remainder operator % can only be used with integral operands.
(b) Short-circuit evaluation occurs with boolean logical operators.
(c) The arithmetic operators *, /, and % have the same level of precedence.
(d) A short value ranges from -128 to +127, inclusive.
(e) (+15) is a legal expression.

5.17 Which statements are true about the lines of output printed by the following program?

```
public class BoolOp {
    static void op(boolean a, boolean b) {
        boolean c = a != b;
        boolean d = a ^ b;
        boolean e = c == d;
        System.out.println(e);
    }
    public static void main(String[] args) {
        op(false, false);
        op(true, false);
        op(false, true);
        op(true, true);
    }
}
```

Select the three correct answers.

- (a) All lines printed are the same.
(b) At least one line contains false.
(c) At least one line contains true.
(d) The first line contains false.
(e) The last line contains true.

5.18 What is the result of running the following program?

```
public class OperandOrder {
    public static void main(String[] args) {
        int i = 0;
        int[] a = {3,6};
        a[i] = i = 9;
        System.out.println(i + " " + a[0] + " " + a[1]);
    }
}
```

Select the one correct answer.

- (a) When run, the program throws an exception of type ArrayIndexOutOfBoundsException.
(b) When run, the program will print "9 9 6".
(c) When run, the program will print "9 0 6".
(d) When run, the program will print "9 3 6".
(e) When run, the program will print "9 3 9".

5.19 Which statements are true about the output from the following program?

```
public class Logic {
    public static void main(String[] args) {
        int i = 0;
        int j = 0;
        boolean t = true;
        boolean r;
        r = (t & 0 < (i+=1));
        r = (t && 0 < (i+=2));
        r = (t | 0 < (j+=1));
        r = (t || 0 < (j+=2));
        System.out.println(i + " " + j);
    }
}
```

Select the two correct answers.

- (a) The first digit printed is 1. (b) The first digit printed is 2.
(c) The first digit printed is 3. (d) The second digit printed is 1.
(e) The second digit printed is 2. (f) The second digit printed is 3.