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

```
public class MyClass {
  public static void main(String[] args) {
    Outer objRef = new Outer();
    System.out.println(objRef.createInner().getSecret());
  }
}
class Outer {
  private int secret;
  Outer() { secret = 123; }
  class Inner {
    int getSecret() { return secret; }
  }
  Inner createInner() { return new Inner(); }
}
```

Select the one correct answer.

(a) The program will fail to compile because the class Inner cannot be declared within the class Outer.

(b) The program will fail to compile because the method createInner() cannot be allowed to pass objects of the class Inner to methods outside of the class Outer.

(c) The program will fail to compile because the field secret is not accessible from the method getSecret().

(d) The program will fail to compile because the method getSecret() is not visible from the main() method in the class MyClass.

(e) The code will compile and print 123, when run.

8.2 Which statements about nested classes are true?

Select the two correct answers.

(a) An instance of a static member class has an inherent outer instance.

(b) A static member class can contain non-static fields.

(c) A static member interface can contain non-static fields.

(d) A static member interface has an inherent outer instance.

(e) An instance of the outer class can be associated with many instances of a non-static member class.

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

```
public class MyClass {
  public static void main(String[] args) {
    State st = new State();
    System.out.println(st.getValue());
    State.Memento mem = st.memento();
    st.alterValue();
    System.out.println(st.getValue());
    mem.restore();
    System.out.println(st.getValue());
  }
  public static class State {
    protected int val = 11;
    int getValue() { return val; }
    void alterValue() { val = (val + 7) % 31; }
    Memento memento() { return new Memento(); }
    class Memento {
      int val;
      Memento() { this.val = State.this.val; }
      void restore() { ((State) this).val = this.val; }
    }
  }
}
```

Select the one correct answer.

(a) The program will fail to compile because the static main() method attempts to create a new instance of the static member class State.

(b) The program will fail to compile because the class State.Memento is not accessible from the main() method.

(c) The program will fail to compile because the non-static member class Memento declares a field with the same name as a field in the outer class State.

(d) The program will fail to compile because the State.this.val expression in the Memento constructor is invalid.

(e) The program will fail to compile because the ((State) this).val expression in the method restore() of the class Memento is invalid.

(f) The program will compile and print 11, 18, and 11, when run.

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

```
public class Nesting {
  public static void main(String[] args) {
    B.C obj = new B().new C();
  }
}
class A {
  int val;
  A(int v) { val = v; }
}
class B extends A {
  int val = 1;
  B() { super(2); }
  class C extends A {
    int val = 3;
    C() {
      super(4);
      System.out.println(B.this.val);
      System.out.println(C.this.val);
      System.out.println(super.val);
    }
  }
}
```

Select the one correct answer.

(a) The program will fail to compile.

(b) The program will compile and print 2, 3, and 4, in that order, when run.

(c) The program will compile and print 1, 4, and 2, in that order, when run.

(d) The program will compile and print 1, 3, and 4, in that order, when run.

(e) The program will compile and print 3, 2, and 1, in that order, when run.

8.5 Which statements about the following program are true?

```
public class Outer {
  public void doIt() {
  }
  public class Inner {
    public void doIt() {
    }
  }
  public static void main(String[] args) {
    new Outer().new Inner().doIt();
  }
}
```

Select the two correct answers.

(a) The doIt() method in the Inner class overrides the doIt() method in the Outer class.

(b) The doIt() method in the Inner class overloads the doIt() method in the Outer class.

(c) The doIt() method in the Inner class hides the doIt() method in the Outer class.

(d) The full name of the Inner class is Outer.Inner.

(e) The program will fail to compile.

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

```
public class Outer {
  private int innerCounter;
  class Inner {
    Inner() {innerCounter++;}
    public String toString() {
      return String.valueOf(innerCounter);
    }
  }
  private void multiply() {
    Inner inner = new Inner();
    this.new Inner();
    System.out.print(inner);
    inner = new Outer().new Inner();
    System.out.println(inner);
  }
  public static void main(String[] args) {
    new Outer().multiply();
  }
}
```

Select the one correct answer.

(a) The program will fail to compile.

(b) The program will compile but throw an exception when run.

(c) The program will compile and print 22, when run.

(d) The program will compile and print 11, when run.

(e) The program will compile and print 12, when run

(f) The program will compile and print 21, when run.

8.7 Which statement is true?

Select the one correct answer.

(a) Non-static member classes must have either default or public accessibility.

(b) All nested classes can declare static member classes.

(c) Methods in all nested classes can be declared static.

(d) All nested classes can be declared static.

(e) Static member classes can contain non-static methods.

8.8 Given the declaration

```
interface IntHolder { int getInt(); }
which of the following methods are valid?
//----(1)----
  IntHolder makeIntHolder(int i) {
    return new IntHolder() {
      public int getInt() { return i; }
    };
  }
//----(2)----
  IntHolder makeIntHolder(final int i) {
    return new IntHolder {
      public int getInt() { return i; }
    };
  }
//----(3)----
  IntHolder makeIntHolder(int i) {
    class MyIH implements IntHolder {
      public int getInt() { return i; }
    }
    return new MyIH();
  }
//----(4)----
  IntHolder makeIntHolder(final int i) {
    class MyIH implements IntHolder {
      public int getInt() { return i; }
    }
    return new MyIH();
  }
//----(5)----
  IntHolder makeIntHolder(int i) {
    return new MyIH(i);
  }
  static class MyIH implements IntHolder {
    final int j;
    MyIH(int i) { j = i; }
    public int getInt() { return j; }
  }
```

Select the two correct answers.

(a) The method labeled (1).

(b) The method labeled (2).

(c) The method labeled (3).

(d) The method labeled (4).

(e) The method labeled (5).

8.9 Which statements are true?

Select the two correct answers.

(a) No other static members, except final static fields, can be declared within a non-static member class.

(b) If a non-static member class is nested within a class named Outer, methods within the non-static member class must use the prefix Outer.this to access the members of the class Outer.

(c) All fields in any nested class must be declared final.

(d) Anonymous classes cannot have constructors.

(e) If objRef is an instance of any nested class within the class Outer, the expression (objRef instanceof Outer) will evaluate to true.

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

```
import java.util.Iterator;
class ReverseArrayIterator<T> implements Iterable<T>{
  private T[] array;
  public ReverseArrayIterator(T[] array) { this.array = array; }
  public Iterator<T> iterator() {
    return new Iterator<T>() {
      private int next = array.length - 1;
      public boolean hasNext() { return (next >= 0); }
      public T next() {
T element = array[next];
        next--;
        return element;
      }
      public void remove() { throw new UnsupportedOperationException(); }
    };
  }
  public static void main(String[] args) {
    String[] array = { "Hi", "Howdy", "Hello" };
    ReverseArrayIterator<String> ra = new ReverseArrayIterator<String>(array);
    for (String str : ra) {
      System.out.print("|" + str + "|");
    }
  }
}
```

Select the one correct answer.

(a) The program will fail to compile.
(b) The program will compile but throw an exception when run.
(c) The program will compile and print |Hi||Howdy||Hello|, when run.
(d) The program will compile and print |Hello||Howdy||Hi|, when run.
(e) The program will compile and print the strings in an unpredictable order, when run.

8.11 Which statement is true?

Select the one correct answer.

(a) Top-level classes can be declared static.
(b) Classes declared as members of top-level classes can be declared static.
(c) Local classes can be declared static.
(d) Anonymous classes can be declared static.
(e) No classes can be declared static.

8.12 Which expression can be inserted at (1) so that compiling and running the program will print LocalVar.str1?

```
public class Access {
  final String str1 = "Access.str1";
  public static void main(final String args[]) {
    final String str1 = "LocalVar.str1";
    class Helper { String getStr1() { return str1; } }
    class Inner {
      String str1 = "Inner.str1";
      Inner() {
        System.out.println( /* (1) INSERT EXPRESSION HERE */ );
      }
    }
    Inner inner = new Inner();
  }
}
```

Select the one correct answer.

(a) str1
(b) this.str1
(c) Access.this.str1
(d) new Helper().getStr1()
(e) this.new Helper().getStr1()
(f) Access.new Helper().getStr1()
(g) new Access.Helper().getStr1()
(h) new Access().new Helper().getStr1()

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

```
public class TipTop {
  static final Integer i1 = 1;
  final Integer i2 = 2;
  Integer i3 = 3;
  public static void main(String[] args) {
    final Integer i4 = 4;
    Integer i5 = 5;
    class Inner {
      final Integer i6 = 6;
      Integer i7 = 7;
      Inner () {
System.out.print(i6 + i7);
      }
    }
  }
}
```

Select the one correct answer.

(a) The program will fail to compile.
(b) The program will compile but throw an exception when run.
(c) The program will compile and print 67, when run.
(d) The program will compile and print 13, when run.
(e) The program will compile but will not print anything, when run.

8.14 Which expressions, when inserted at (1), will result in compile-time errors?

```
public class TopLevel {
  static final Integer i1 = 1;
  final Integer i2 = 2;
  Integer i3 = 3;
  public static void main(String[] args) {
    final Integer i4 = 4;
    Integer i5 = 5;
    class Inner {
      final Integer i6 = 6;
      Integer i7 = 7;
      Inner (final Integer i8, Integer i9) {
        System.out.println(/* (1) INSERT EXPRESSION HERE */);
      }
    }
    new Inner(8, 9);
  }
}
```

Select the three correct answers.

(a) i1
(b) i2
(c) i3
(d) i4
(e) i5
(f) i6
(g) i7
(h) i8
(i) i9