이것이 자바다 확인 문제 정답

1장 확인 문제

1. 4
2. 3
3. 3->1->2->4
4. 4
5. 4
6. 4

2장 확인 문제

1. 4
2. 1,4,5
3. 정수타입: byte, char, short, int, long 실수타입: float, double 논리타입:boolean
4. 타입: int, double 변수이름: age, price 리터럴: 10, 3.14
5. 3
6. 4
7. 3
8. 1

3장 확인 문제

1. 3
2. 31
3. 가
4. #1: pencils/students, #2: pencils%students
5. 356/100*100
6. (lengthTop+lengthBottom) * height / 2.0
7. true, false
8. Double.isNaN(z)

4장 확인 문제

1. 조건문: if, switch 반복문: for, while, do-while
2. 2

3. ##############################

```
public class Exercise03 {
  public static void main(String[] args) {
    int sum = 0;
    for(int i=1; i<=100; i++) {
      if(i%3 == 0) {
        sum += i;
      }
    }
    System.out.println("3의 배수의 합: " + sum);
  }
}
```

4. ##############################

```
public class Exercise04 {
  public static void main(String[] args) {
    while(true) {
      int num1 = (int)(Math.random()*6) + 1;
      int num2 = (int)(Math.random()*6) + 1;
      System.out.println("(" + num1 + ", " + num2 + ")");
      if( (num1+num2) == 5) {
        break;
      }
    }
  }
}
```

5. ##############################

```
public class Exercise05 {
  public static void main(String[] args) {
    for(int x=1; x<=10; x++) {
      for(int y=1; y<=10; y++) {
        if( (4*x + 5*y) == 60) {
          System.out.println("(" + x + ", " + y + ")");
        }
      }
```

```
   }
  }
}
```

6. ##############################

```
public class Exercise06 {
  public static void main(String[] args) {
    for(int i=1; i<=5; i++) {
      for(int j=1; j<=i; j++) {
        System.out.print("*");
        if(j==i) {
          System.out.println();
        }
      }
    }
  }
}
```

7. ##############################

```
import java.util.Scanner;

public class    Exercise07 {
  public static void main(String[] args) {
    boolean run = true;

    int balance = 0;

    Scanner scanner = new Scanner(System.in);

    while(run) {
      System.out.println("-------------------------------------");
      System.out.println("1.예금 | 2.출금 | 3.잔고 | 4.종료");
      System.out.println("-------------------------------------");
      System.out.print("선택> ");

      int menuNum = scanner.nextInt();
```

```
    switch(menuNum) {
      case 1:
        System.out.print("예금액>");
        balance += scanner.nextInt();
        break;
      case 2:
        System.out.print("출금액>");
        balance -= scanner.nextInt();
        break;
      case 3:
        System.out.print("잔고>");
        System.out.println(balance);
        break;
      case 4:
        run = false;
        break;
    }

    System.out.println();
  }

  System.out.println("프로그램 종료");
 }
}
```

5장 확인 문제

1. 4
2. 3
3. 2
4. 2
5. 3
6. 3, 5

7.

```
################################
public class Exercise07 {
```

```
  public static void main(String[] args) {
        int max = 0;
        int[] array = { 1, 5, 3, 8, 2 };

    for(int i=0; i<array.length; i++) {
      if(max<array[i]) {
        max = array[i];
      }
    }

        System.out.println("max: " + max);
  }
}
```

8.#################################

```
public class Exercise08 {
  public static void main(String[] args) {
    int[][] array = {
       {95, 86},
       {83, 92, 96},
       {78, 83, 93, 87, 88}
    };

    int sum = 0;
    double avg = 0.0;

    int count = 0;
    for(int i=0; i<array.length; i++) {
      for(int j=0; j<array[i].length; j++) {
        sum += array[i][j];
        count++;
      }
    }
    avg = (double) sum / count;

    System.out.println("sum: " + sum);
```

```
    System.out.println("avg: " + avg);
  }
}
```

9.################################

```
import java.util.Scanner;

public class Exercise09 {
  public static void main(String[] args) {
    boolean run = true;

    int studentNum = 0;
    int[] scores = null;

    Scanner scanner = new Scanner(System.in);

    while(run) {
      System.out.println("-----------------------------------------------------------");
      System.out.println("1.학생수 | 2.점수입력 | 3.점수리스트 | 4.분석 | 5.종료");
      System.out.println("-----------------------------------------------------------");
      System.out.print("선택> ");

      int selectNo = scanner.nextInt();

      if(selectNo == 1) {
        System.out.print("학생수> ");
        studentNum = scanner.nextInt();
        scores = new int[studentNum];
      } else if(selectNo == 2) {
        for(int i=0; i<scores.length; i++) {
          System.out.print("scores[" + i + "]> ");
          scores[i] = scanner.nextInt();
        }
      } else if(selectNo == 3) {
        for(int i=0; i<scores.length; i++) {
          System.out.println("scores[" + i + "]: " + scores[i]);
```

```
      }
    } else if(selectNo == 4) {
      int max = 0;
      int sum = 0;
      double avg = 0;
      for(int i=0; i<scores.length; i++) {
        max = (max<scores[i])? scores[i] : max;
        sum += scores[i];
      }
      avg = (double) sum / studentNum;
      System.out.println("최고 점수: " + max);
      System.out.println("평균 점수: " + avg);
    } else if(selectNo == 5) {
      run = false;
    }
  }

  System.out.println("프로그램 종료");
 }
}
```

6장 확인 문제

1. 3
2. 4
3. 4
4. 3
5. 1
6. 4
7. 2
8. 2
9. 2
10. 4
11. 3
12. Field(필드), Constructor(생성자), Method(메소드)

13.####################################

```
public class Member {
  String name;
  String id;
  String password;
  int age;
}
```

14.####################################

```
public class Member {
  String name;
  String id;
  String password;
  int age;

  Member(String name, String id) {
    this.name = name;
    this.id = id;
  }
}
```

15.####################################

```
public class MemberService {
  boolean login(String id, String password) {
    if(id.equals("hong") && password.equals("12345")) {
      return true;
    } else {
      return false;
    }
  }

  void logout(String id) {
    System.out.println("로그아웃  되었습니다.");
  }
}
public class MemberServiceExample {
  public static void main(String[] args) {
```

```
    MemberService memberService = new MemberService();
    boolean result = memberService.login("hong", "12345");
    if(result) {
      System.out.println("로그인 되었습니다.");
      memberService.logout("hong");
    } else {
      System.out.println("id 또는 password가 올바르지 않습니다.");
    }
  }
}
```

16.####################################

```
public class Printer {
  void println(int value) {
    System.out.println(value);
  }

  void println(boolean value) {
    System.out.println(value);
  }

  void println(double value) {
    System.out.println(value);
  }

  void println(String value) {
    System.out.println(value);
  }
}
public class PrinterExample {
  public static void main(String[] args) {
    Printer printer = new Printer();
    printer.println(10);
    printer.println(true);
    printer.println(5.7);
    printer.println("홍길동");
```

```
  }
}
```

17.####################################

```
public class Printer {
  static void println(int value) {
    System.out.println(value);
  }

  static void println(boolean value) {
    System.out.println(value);
  }

  static void println(double value) {
    System.out.println(value);
  }

  static void println(String value) {
    System.out.println(value);
  }
}
public class PrinterExample {
  public static void main(String[] args) {
    Printer.println(10);
    Printer.println(true);
    Printer.println(5.7);
    Printer.println("홍길동");
  }
}
```

18.####################################

```
public class ShopService {
  private static ShopService singleton = new ShopService();

  private ShopService() {}
```

```
  static ShopService getInstance() {
    return singleton;
  }
}
public class ShopServiceExample {
  public static void main(String[] args) {
    ShopService obj1 = ShopService.getInstance();
    ShopService obj2 = ShopService.getInstance();

    if(obj1 == obj2) {
      System.out.println("같은 ShopService 객체 입니다.");
    } else {
      System.out.println("다른 ShopService 객체 입니다.");
    }
  }
}
```

19.####################################

```
public class Account {
  public static final int MIN_BALANCE = 0;
  public static final int MAX_BALANCE = 1000000;
  private int balance;

  public int getBalance() {
    return balance;
  }

  public void setBalance(int balance) {
    if(balance<Account.MIN_BALANCE || balance>Account.MAX_BALANCE) {
      return;
    }
    this.balance = balance;
  }
}
public class AccountExample {
  public static void main(String[] args) {
```

```
    Account account = new Account();

    account.setBalance(10000);
    System.out.println("현재 잔고: " + account.getBalance());

    account.setBalance(-100);
    System.out.println("현재 잔고: " + account.getBalance());

    account.setBalance(2000000);
    System.out.println("현재 잔고: " + account.getBalance());

    account.setBalance(300000);
    System.out.println("현재 잔고: " + account.getBalance());
  }
}
```

20.####################################

```
public class Account {
  private String ano;
  private String owner;
  private int balance;

  public Account(String ano, String owner, int balance) {
    this.ano = ano;
    this.owner = owner;
    this.balance = balance;
  }

  public String getAno() { return ano; }
  public void setAno(String ano) { this.ano = ano; }
  public String getOwner() { return owner; }
  public void setOwner(String owner) { this.owner = owner; }
  public int getBalance() { return balance; }
  public void setBalance(int balance) { this.balance = balance; }
}
import java.util.Scanner;
```

```
public class BankApplication {
  private static Account[] accountArray = new Account[100];
  private static Scanner scanner = new Scanner(System.in);

  public static void main(String[] args) {
    boolean run = true;
    while(run) {
      System.out.println("-----------------------------------------------------------");
      System.out.println("1.계좌생성 | 2.계좌목록 | 3.예금 | 4.출금 | 5.종료");
      System.out.println("-----------------------------------------------------------");
      System.out.print("선택> ");

      int selectNo = scanner.nextInt();

      if(selectNo == 1) {
        createAccount();
      } else if(selectNo == 2) {
        accountList();
      } else if(selectNo == 3) {
        deposit();
      } else if(selectNo == 4) {
        withdraw();
      } else if(selectNo == 5) {
        run = false;
      }
    }
    System.out.println("프로그램 종료");
  }

  //계좌생성하기
  private static void createAccount() {
    System.out.println("--------------");
    System.out.println("계좌생성");
    System.out.println("--------------");
```

```
  System.out.print("계좌번호: ");
  String ano = scanner.next();

  System.out.print("계좌주: ");
  String owner = scanner.next();

  System.out.print("초기입금액: ");
  int balance = scanner.nextInt();

  Account newAccount = new Account(ano, owner, balance);
  for(int i=0; i<accountArray.length; i++) {
    if(accountArray[i] == null) {
      accountArray[i] = newAccount;
      System.out.println("결과: 계좌가 생성되었습니다.");
      break;
    }
  }
}

//계좌목록보기
private static void accountList() {
  System.out.println("--------------");
  System.out.println("계좌목록");
  System.out.println("--------------");
  for(int i=0; i<accountArray.length; i++) {
    Account account = accountArray[i];
    if(account != null) {
      System.out.print(account.getAno());
      System.out.print("         ");
      System.out.print(account.getOwner());
      System.out.print("         ");
      System.out.print(account.getBalance());
      System.out.println();
    }
  }
}
```

```
//예금하기
private static void deposit() {
  System.out.println("--------------");
  System.out.println("예금");
  System.out.println("--------------");
  System.out.print("계좌번호: ");
  String ano = scanner.next();
  System.out.print("예금액: ");
  int money = scanner.nextInt();
  Account account = findAccount(ano);
  if(account == null) {
    System.out.println("결과: 계좌가 없습니다.");
    return;
  }
  account.setBalance(account.getBalance() + money);
  System.out.println("결과: 예금이 성공되었습니다.");
}

//출금하기
private static void withdraw() {
  System.out.println("--------------");
  System.out.println("출금");
  System.out.println("--------------");
  System.out.print("계좌번호: ");
  String ano = scanner.next();
  System.out.print("출금액: ");
  int money = scanner.nextInt();
  Account account = findAccount(ano);
  if(account == null) {
    System.out.println("결과: 계좌가 없습니다.");
    return;
  }
  account.setBalance(account.getBalance() - money);
  System.out.println("결과: 출금이 성공되었습니다.");
}
```

```
 //Account 배열에서 ano와 동일한 Account 객체 찾기
 private static Account findAccount(String ano) {
  Account account = null;
  for(int i=0; i<accountArray.length; i++) {
   if(accountArray[i] != null) {
    String dbAno = accountArray[i].getAno();
    if(dbAno.equals(ano)) {
     account = accountArray[i];
     break;
    }
   }
  }
  return account;
 }
}
```

7장 확인 문제

1. 1
2. 2
3. 1
4. 4
5. 부모 생성자를 올바르게 호출하지 않았다. 수정: Child.java에서 5라인을 지우고 super(name); 코드를 넣는다.

6. ##########################
Parent(String nation) call
Parent() call
Child(String name) call
Child() call

7. ##########################
스노우 타이어가 굴러갑니다.
스노우 타이어가 굴러갑니다.

8. 2

8장 확인 문제

1. 3

2. 4

3. ##################################

```
public class Cat implements Soundable {
  @Override
  public String sound() {
    return "야옹";
  }
}
public class Dog implements Soundable {
  @Override
  public String sound() {
    return "멍멍";
  }
}
```

4. ##################################

```
public interface DataAccessObject {
  public void select();
  public void insert();
  public void update();
  public void delete();
}
public class OracleDao implements DataAccessObject   {
  @Override
  public void select() {
    System.out.println("Oracle DB에서 검색");
  }

  @Override
  public void insert() {
    System.out.println("Oracle DB에 삽입");
  }
```

```
 @Override
 public void update() {
  System.out.println("Oracle DB를 수정");
 }

 @Override
 public void delete() {
  System.out.println("Oracle DB에서 삭제");
 }
}
public class MySqlDao implements DataAccessObject  {
 @Override
 public void select() {
  System.out.println("MySql DB에서 검색");
 }

 @Override
 public void insert() {
  System.out.println("MySql DB에 삽입");
 }

 @Override
 public void update() {
  System.out.println("MySql DB를 수정");
 }

 @Override
 public void delete() {
  System.out.println("MySql DB에서 삭제");
 }
}
```

5. ##########

```
public class ActionExample {
 public static void main(String[] args) {
```

```
    Action action = new Action() {
      @Override
      public void work() {
        System.out.println("복사를 합니다.");
      }
    };

    action.work();
  }
}
```

9장 확인 문제

1. 4
2. 3
3. 3

4. ######################

```
public class NestedClassExample {
  public static void main(String[] args) {
    Car myCar = new Car();

    Car.Tire tire = myCar.new Tire();

    Car.Engine engine = new Car.Engine();
  }
}
```

5. ######################

```
public class Anonymous {
  Vehicle field = new Vehicle() {
    @Override
    public void run() {
      System.out.println("자전거가 달립니다.");
    }
  };
```

```
  void method1() {
    Vehicle localVar = new Vehicle() {
      @Override
      public void run() {
        System.out.println("승용차가 달립니다.");
      }
    };
    localVar.run();
  }

  void method2(Vehicle v) {
    v.run();
  }
}

public class AnonymousExample {
  public static void main(String[] args) {
    Anonymous anony = new Anonymous();
    //익명 객체 필드 사용
    anony.field.run();
    //익명 객체 로컬변수 사용
    anony.method1();
    //익명 객체 매개값 사용
    anony.method2(
      new Vehicle() {
        @Override
        public void run() {
          System.out.println("트럭이 달립니다.");
        }
      }
    );
  }
}
```

6. ##########################

nickName은 final 특성을 갖기 때문에 4라인에서 값을 변경할 수 없다.
수정: 3,4 라인을 없애고 대신 String nickName = chatId; 를 넣는다.

10장 확인 문제

1. 4
2, 3
3. 4
4. 2
5. 3

6. ##############################
10
숫자로 변환할 수 없음
10
인덱스를 초과했음
10

7. ##############################
```
public class NotExistIDException extends Exception {
 public NotExistIDException() {}
 public NotExistIDException(String message) {
  super(message);
 }
}

public class WrongPasswordException extends Exception {
 public WrongPasswordException() {}
 public WrongPasswordException(String message) {
  super(message);
 }
}

public class LoginExample {
 public static void main(String[] args) {
  try {
```

```
    login("white", "12345");
   } catch(Exception e) {
    System.out.println(e.getMessage());
   }

   try {
    login("blue", "54321");
   } catch(Exception e) {
    System.out.println(e.getMessage());
   }
  }

  public static void login(String id, String password) throws NotExistIDException,
WrongPasswordException {
   //id가 blue가 아니라면 NotExistIDException 발생시킴
   if(!id.equals("blue")) {
    throw new NotExistIDException("아이디가 존재하지 않습니다.");
   }

   //password가 12345가 아니라면 WrongPasswordException 발생시킴
   if(!password.equals("12345")) {
    throw new WrongPasswordException("패스워드가 틀립니다.");
   }
  }
}
```

11장 확인 문제

1. 4
2. hashCode(), equals()

3. ######################

```
public class Student {
 private String studentNum;

 public Student(String studentNum) {
  this.studentNum = studentNum;
```

```
  }

  public String getStudentNum() {
    return studentNum;
  }

  @Override
  public boolean equals(Object obj) {
    if(obj instanceof Student) {
      Student student = (Student) obj;
      if(studentNum.equals(student.getStudentNum())) {
        return true;
      }
    }
    return false;
  }

  @Override
  public int hashCode() {
    return studentNum.hashCode();
  }
}
```

4. ######################

```
public class Member {
  private String id;
  private String name;

  public Member(String id, String name) {
    this.id = id;
    this.name = name;
  }

  @Override
  public String toString() {
    return id + ": " + name;
```

```
 }
}
```

5. 4

6. new String(bytes)

7. ##########################

```
str.indexOf("자바")
str.replace("자바", "Java")
```

8. ##########################

```
import java.util.StringTokenizer;

public class SplitExample {
 public static void main(String[] args) {
  String str = "아이디,이름,패스워드";

  //방법1(splict() 메소드 이용)
  String[] tokens = str.split(",");
  for(String token : tokens) {
   System.out.println(token);
  }

  System.out.println();

  //방법2(StringTokenizer 이용)
  StringTokenizer st = new StringTokenizer(str, ",");
  while(st.hasMoreTokens()) {
   String token = st.nextToken();
   System.out.println(token);
  }
 }
}
```

9. ##########################

```
public class StringBuilderExample {
  public static void main(String[] args) {
    String str = "";
    for(int i=1; i<=100; i++) {
      str += i;
    }
    System.out.println(str);

    StringBuilder sb = new StringBuilder();
    for(int i=1; i<=100; i++) {
      sb.append(i);
    }
    str = sb.toString();
    System.out.println(str);
  }
}
```

10. ##########################

```
import java.util.regex.Pattern;

public class PatternMatcherExample {
  public static void main(String[] args) {
    String id = "5Angel1004";
    String regExp = "[a-zA-Z][a-zA-Z0-9]{7,11}";
    boolean isMatch = Pattern.matches(regExp, id);
    if(isMatch) {
      System.out.println("ID로 사용할 수 있습니다.");
    } else {
      System.out.println("ID로 사용할 수 없습니다.");
    }
  }
}
```

11. ##########################

값의 범위가 -128~127 이면 == 은 값을 비교하고
그 이외에는 번지를 비교하기 때문입니다.

<이것이 자바다> 532 페이지 참조

12. ##########################
```
public class StringConvertExample {
  public static void main(String[] args) {
    String strData1 = "200";
    int intData1 = Integer.parseInt(strData1);

    int intData2 = 150;
    String strData2 = String.valueOf(intData2);
  }
}
```

13. ##########################
```
import java.text.SimpleDateFormat;
import java.util.Date;

public class DatePrintExample {
  public static void main(String[] args) {
    Date now = new Date();

    SimpleDateFormat sdf = new SimpleDateFormat("yyyy년 MM월 dd일 E요일 HH시 mm분");
    System.out.println( sdf.format(now) );
  }
}
```

12장 확인 문제

1. 4

2. ##############################
```
public class MovieThread extends Thread {
  @Override
  public void run() {
    for(int i=0;i<3;i++) {
      System.out.println("동영상을 재생합니다.");
      try {
```

```
      Thread.sleep(1000);
    } catch (InterruptedException e) {
    }
   }
  }
}

public class MusicRunnable implements Runnable {
  @Override
  public void run() {
   for(int i=0;i<3;i++) {
    System.out.println("음악을  재생합니다.");
    try {
      Thread.sleep(1000);
    } catch (InterruptedException e) {
    }
   }
  }
}

public class ThreadExample {
  public static void main(String[] args) {
   Thread thread1 = new MovieThread();
   thread1.start();

   Thread thread2 = new Thread(new MusicRunnable());
   thread2.start();
  }
}
```

3. 4
4. 2
5. 4
6. 4
7. 2

8. ##################################
```
public class MovieThread extends Thread {
  @Override
  public void run() {
    while(true) {
      System.out.println("동영상을  재생합니다.");
      if(this.isInterrupted()) {
        break;
      }
    }
  }
}
```

9. 3

10. ##################################
```
thread.setDaemon(true);
```

11. 1
12. 4
13. 1

13장 확인 문제

1. 4

2. ##################################
```
public class Container<T> {
  private T t;
  public T get() { return t; }
  public void set(T t) { this.t = t; }
}
```

3. ##################################
```
public class Container<K, V> {
  private K key;
```

```
  private V value;

  public K getKey() {
    return this.key;
  }

  public V getValue() {
    return this.value;
  }

  public void set(K key, V value) {
    this.key = key;
    this.value = value;
  }
}
```

4. ##################################

```
public class Util {
  //how1
  public static <K, V> V getValue(Pair<K, V> p, K k) {
    if(p.getKey() == k) {
      return p.getValue();
    } else {
      return null;
    }
  }

  //how2
  /*public static <P extends Pair<K, V>, K, V> V getValue(P p, K k) {
    if(p.getKey() == k) {
      return p.getValue();
    } else {
      return null;
    }
  }*/
```

```
}
```

14장 확인 문제

1. 4

2. 4

3. 2

4. ################################

6라인에서 x 변수의 값을 수정할 수 없다. x는 final 특성을 갖기 때문

5. ################################

```
 public static void main(String[] args) {
  //최대값 얻기
  int max = maxOrMin(
   (a, b) -> {
    if(a>=b) return a;
    else return b;
   }
  );
  System.out.println("최대값: " + max);

  //최소값 얻기
  int min = maxOrMin( (a, b) -> (a<=b)?a:b );
  System.out.println("최소값: " + min);
 }
```

6. ################################

```
 public static double avg(ToIntFunction<Student> function) {
  int sum = 0;
  for(Student student : students) {
   sum += function.applyAsInt(student);
  }
  double avg = (double) sum / students.length;
  return avg;
 }
```

7. ################################

```
 public static void main(String[] args) {
   double englishAvg = avg( Student::getEnglishScore );
   System.out.println("영어 평균 점수: " + englishAvg);

   double mathAvg = avg( Student::getMathScore );
   System.out.println("수학 평균 점수: " + mathAvg);
 }
```

15장 확인 문제

1. 4
2. 3
3. 4
4. 3
5. List<Board> 변수 = new ArrayList<Board>(); 또는 new ArrayList<>();
6. Map<String, Integer> 변수 = new HashMap<String, Integer>();

7. ###################################

```
import java.util.ArrayList;
import java.util.List;

public class BoardDao {
 public List<Board> getBoardList() {
   List<Board> list = new ArrayList<Board>();
   list.add(new Board("제목1", "내용1"));
   list.add(new Board("제목2", "내용2"));
   list.add(new Board("제목3", "내용3"));
   return list;
 }
}
```

8. ###################################

```
public class Student {
 public int studentNum;
 public String name;
```

```
  public Student (int studentNum, String name) {
    this.studentNum = studentNum;
    this.name = name;
  }

  @Override
  public int hashCode() {
    return studentNum;
  }

  @Override
  public boolean equals(Object obj) {
    if(!(obj instanceof Student)) return false;
    Student student = (Student) obj;
    if(studentNum != student.studentNum) return false;
    return true;
  }
}
```

9. ##################################

```
import java.util.HashMap;
import java.util.Map;
import java.util.Set;

public class MapExample {
  public static void main(String[] args) {
    Map<String,Integer> map = new HashMap<String,Integer>();
    map.put("blue", 96);
    map.put("hong", 86);
    map.put("white", 92);

    String name = null;
    int maxScore = 0;
    int totalScore = 0;
```

```
    Set<Map.Entry<String,Integer>> entrySet = map.entrySet();
    for(Map.Entry<String,Integer> entry : entrySet) {
      if(entry.getValue()>maxScore) {
        name = entry.getKey();
        maxScore = entry.getValue();
      }
      totalScore += entry.getValue();
    }

    int avgScore = totalScore / map.size();
    System.out.println("평균점수: " + avgScore);

    System.out.println("최고점수: " + maxScore);
    System.out.println("최고점수를 받은 아이디: " + name);
  }
}
```

10. ###################################

```
public class Student implements Comparable<Student> {
  public String id;
  public int score;

  public Student (String id, int score) {
    this.id = id;
    this.score = score;
  }

  @Override
  public int compareTo(Student o) {
    if(score < o.score) return -1;
    else if(score == o.score) return 0;
    else return 1;
  }
}
```

16장 확인 문제

1. 4
2. 2
3. 4
4. 3

5. ############################

```
public class StreamExample {
  public static void main(String[] args) {
    List<String> list = Arrays.asList(
      "This is a java book",
      "Lambda Expressions",
      "Java8 supports lambda expressions"
    );
    list.stream()
      .filter(a -> a.toLowerCase().contains("java"))
      .forEach(a -> System.out.println(a));
  }
}
```

6. ############################

```
    double avg = list.stream()
      .mapToInt(Member::getAge)
      .average()
      .getAsDouble();
```

7. ############################

```
    List<Member> developers = list.stream()
      .filter(m -> m.getJob().equals("개발자"))
      .collect(Collectors.toList());
```

8. ############################

```
    Map<String, List<String>> groupingMap = list.stream()
      .collect(
        Collectors.groupingBy(
          Member::getJob,
```

```
        Collectors.mapping(Member::getName, Collectors.toList())
      )
    );
```

17장 확인 문제

1. ##

[AppMain.java]

```
package verify.exam01;

import javafx.application.Application;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.stage.Stage;

public class AppMain extends Application {
 @Override
 public void start(Stage primaryStage) throws Exception {
  Parent root = FXMLLoader.load(getClass().getResource("root.fxml"));
  Scene scene = new Scene(root);

  primaryStage.setTitle("AppMain");
  primaryStage.setScene(scene);
  primaryStage.setResizable(false);
  primaryStage.show();
 }

 public static void main(String[] args) {
  launch(args);
 }
}
```

[root.fxml]

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<?import javafx.scene.layout.*?>
<?import javafx.scene.control.*?>

<BorderPane xmlns:fx="http://javafx.com/fxml" fx:controller="verify.exam01.RootController">
 <center>
  <TableView fx:id="tableView" prefHeight="200" prefWidth="420" >
   <columns>
    <TableColumn prefWidth="100" resizable="false" text="이름" />
    <TableColumn prefWidth="100" resizable="false" text="국어" />
    <TableColumn prefWidth="100" resizable="false" text="수학" />
    <TableColumn prefWidth="100" resizable="false" text="영어" />
   </columns>
  </TableView>
 </center>
 <bottom>
  <HBox prefHeight="50" alignment="CENTER">
   <children>
    <Button fx:id="btnAdd" text="추가" />
   </children>
  </HBox>
 </bottom>
</BorderPane>
```

[RootController.java]

```
package verify.exam01;

import java.net.URL;
import java.util.ResourceBundle;

import javafx.fxml.Initializable;

public class RootController implements Initializable {
 @Override
 public void initialize(URL location, ResourceBundle resources) {
 }
}
```

2. ##

[AppMain.java]

```
package verify.exam02;

import javafx.application.Application;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.stage.Stage;

public class AppMain extends Application {
 @Override
 public void start(Stage primaryStage) throws Exception {
  Parent root = (Parent)FXMLLoader.load(getClass().getResource("root.fxml"));
  Scene scene = new Scene(root);

  primaryStage.setTitle("AppMain");
  primaryStage.setScene(scene);
  primaryStage.setResizable(false);
  primaryStage.show();
 }

 public static void main(String[] args) {
  launch(args);
 }
}
```

[root.fxml]

```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.scene.layout.*?>
<?import javafx.scene.control.*?>

<BorderPane xmlns:fx="http://javafx.com/fxml" fx:controller="verify.exam02.RootController">
```

```
 <center>
  <TableView fx:id="tableView" prefHeight="200" prefWidth="420" >
   <columns>
    <TableColumn prefWidth="100" resizable="false" text="이름" />
    <TableColumn prefWidth="100" resizable="false" text="국어" />
    <TableColumn prefWidth="100" resizable="false" text="수학" />
    <TableColumn prefWidth="100" resizable="false" text="영어" />
   </columns>
  </TableView>
 </center>
 <bottom>
  <HBox prefHeight="50" alignment="CENTER">
   <children>
    <Button fx:id="btnAdd" text="추가" />
   </children>
  </HBox>
 </bottom>
</BorderPane>
```

[form.fxml]

```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.scene.layout.*?>
<?import javafx.geometry.*?>
<?import javafx.scene.control.*?>

<BorderPane xmlns:fx="http://javafx.com/fxml">
    <padding>
        <Insets bottom="10.0" left="20.0" right="20.0" top="20.0" />
    </padding>
    <center>
        <GridPane hgap="10.0" vgap="10.0">
            <children>
                <Label text="이름" prefWidth="50" />
                <Label text="국어" prefWidth="50" GridPane.rowIndex="1" />
                <Label text="수학" prefWidth="50" GridPane.rowIndex="2" />
```

```
                <Label text="영어" prefWidth="50" GridPane.rowIndex="3" />
                <TextField id="txtName" prefWidth="100" GridPane.columnIndex="1" />
                <TextField id="txtKorean" prefWidth="100" GridPane.columnIndex="1"
GridPane.rowIndex="1" />
                <TextField id="txtMath" prefWidth="100" GridPane.columnIndex="1"
GridPane.rowIndex="2" />
                <TextField id="txtEnglish" prefWidth="100" GridPane.columnIndex="1"
GridPane.rowIndex="3" />
            </children>
        </GridPane>
    </center>
    <bottom>
        <HBox alignment="CENTER" spacing="20.0">
            <BorderPane.margin>
                <Insets top="20.0" bottom="10"/>
            </BorderPane.margin>
            <children>
                <Button id="btnFormAdd" text="저장" />
                <Button id="btnFormCancel" text="취소" />
            </children>
        </HBox>
    </bottom>
</BorderPane>
```

[RootController.java]

```
package verify.exam02;

import java.io.IOException;
import java.net.URL;
import java.util.ResourceBundle;

import verify.exam03.Student;
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.fxml.FXMLLoader;
import javafx.fxml.Initializable;
```

```
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.scene.control.Button;
import javafx.scene.control.Label;
import javafx.scene.control.TextField;
import javafx.stage.Modality;
import javafx.stage.Stage;
import javafx.stage.StageStyle;

public class RootController implements Initializable {
 @FXML private Button btnAdd;

 @Override
 public void initialize(URL location, ResourceBundle resources) {
  btnAdd.setOnAction(event->handleBtnAddAction(event));
 }

 private void handleBtnAddAction(ActionEvent event) {
  try {
   Stage dialog = new Stage(StageStyle.UTILITY);
   dialog.initModality(Modality.WINDOW_MODAL);
   dialog.initOwner(btnAdd.getScene().getWindow());
   dialog.setTitle("추가");

   Parent parent = FXMLLoader.load(getClass().getResource("form.fxml"));

   Button btnFormCancel = (Button) parent.lookup("#btnFormCancel");
   btnFormCancel.setOnAction(e->dialog.close());

   Scene scene = new Scene(parent);
   dialog.setScene(scene);
   dialog.setResizable(false);
   dialog.show();
  } catch (IOException e) {}
 }
}
```

3. <이것이 자바다> 소스 참조
4. <이것이 자바다> 소스 참조
5. <이것이 자바다> 소스 참조

18장 확인 문제

1. 1
2. 1
3. 4
4. 1
5. 3
6. 3

7.

```
import java.io.BufferedReader;
import java.io.FileReader;

public class AddLineNumberExample {
	public static void main(String[] args) throws Exception {
		String filePath =
			"C:/JavaProgramming/source/chap18/src/sec05/exam04_bufferedreader/BufferedRe
			aderExample.java";

		FileReader fr = new FileReader(filePath);
		BufferedReader br = new BufferedReader(fr);

		int rowNumber = 0;
		String rowData;
		while( (rowData=br.readLine())!= null ) {
			System.out.println(++rowNumber + ": " + rowData);
		}

		br.close(); fr.close();
	}
}
```

8. 2

9.
(1) new Socket(“localhost”, 5001);
(2) serverSocket.accept();

10.
(1) InputStream (2) OutputStream
(3) OutputStream (3) InputStream

11.
[ClientExample.java]

```
import java.io.File;
import java.io.FileInputStream;
import java.io.InputStream;
import java.io.OutputStream;
import java.net.Socket;
import java.util.Arrays;


public class ClientExample {
	public static void main(String[] args) throws Exception {
		Socket socket = new Socket("localhost", 5001);
		OutputStream os = socket.getOutputStream();

		String filePath =
		   "C:/JavaProgramming/source/chap18/src/sec04/exam03_fileoutputstream/house.jpg";
		File file = new File(filePath);

		String fileName = file.getName();
		byte[] fileNameBytes = fileName.getBytes("UTF-8");
		fileNameBytes = Arrays.copyOf(fileNameBytes, 100);
		os.write(fileNameBytes);
```

```
            System.out.println("[파일 보내기 시작] " + fileName);
            FileInputStream fis = new FileInputStream(file);
            byte[] bytes = new byte[1000];
            int readByteCount = -1;
            while((readByteCount=fis.read(bytes))!=-1) {
                os.write(bytes, 0, readByteCount);
            }

            os.flush();
            System.out.println("[파일 보내기 완료]");

            fis.close();
            os.close();
            socket.close();
        }
}
```

[ServerExample.java]

```
import java.io.FileOutputStream;
import java.io.InputStream;
import java.net.InetSocketAddress;
import java.net.ServerSocket;
import java.net.Socket;

public class ServerExample {
    public static void main(String[] args) throws Exception {
        ServerSocket serverSocket = new ServerSocket();
        serverSocket.bind(new InetSocketAddress("localhost", 5001));

        System.out.println("[서버 시작]");

        while(true) {
            try {
                Socket socket = serverSocket.accept();

                InputStream is = socket.getInputStream();
```

```
                byte[] bytes = new byte[1000];
                int readByteCount = -1;

                is.read(bytes, 0, 100);
                String fileName = new String(bytes, 0, 100, "UTF-8");
                fileName = fileName.trim();

                System.out.println("[파일 받기 시작] " + fileName);
                FileOutputStream fos = new FileOutputStream("C:/Temp/" + fileName);
                while((readByteCount=is.read(bytes))!=-1) {
                    fos.write(bytes, 0, readByteCount);
                }
                fos.flush();
                System.out.println("[파일 받기 완료]");

                fos.close();
                is.close();
                socket.close();
            } catch(Exception e) {
                break;
            }
        }

        serverSocket.close();
        System.out.println("[서버 종료]");
    }
}
```

19장 확인 문제

1. 2
2. 4
3. 2
4. 4
5. 3

6.

(1) SocketChannel

(2) ServerSocketChannel

(3) SocketChannel

7. 4

8.

(1) new CompletionHandler<AsynchronousSocketChannel, Void> ( )

(2) asynchronousServerSocketChannel.accept(null, this);