

Last Name	
First Name	
Student Number	
Instructor	Harley

Instructions

- Read all of the instructions before you start to answer the questions.
 - Total questions: 25 multiple choice questions (1 point each) and one programming question (20 points)
 - Total marks: 45
 - Time limit: 2.5 hours
- No calculators, cell phones, extra paper or aids of any kind.
- Write your name and student number on each page.
- Answer the multiple choice questions on the bubble sheet, and the programming question in the space provided.
- Do not unstaple the pages.
- Questions that involve syntax concern the Java programming language.
- If a multiple choice question has more than one 'correct' answer, you must choose the 'best' answer, i.e., the answer which is correct with the least or the simplest assumptions. The professor will not interpret a question for you, unless there is a typographical error.
- Answer the following programming question on the next two blank pages:

Programming Question

```
/**
```

```
Write a class Pair that has:
```

```
--two private instance fields called first and second, which are Strings
```

```
--a constructor with two parameters for initializing the fields
```

```
--a predicate method inOrder() which returns true if first comes before  
second alphabetically or if first and second are the same.
```

```
--a toString() method which returns a representation like "[first, second]"  
if first were "first" and second were "second"
```

```
--a method boolean equals(Pair other) which returns true if this  
pair is equivalent to the other pair, i.e., the first words match and  
the second words match.
```

```
--a method int count(Pair[] array) which returns a count of how many  
pairs in the array match this pair.
```

```
*/
```

```
/**
```

```
Write a class PairTester which has a main method which
```

```
--constructs a Pair using your first name and your last name, simply use your own first name and  
last name, without reading that from the user.
```

```
--reads from standard input 100 words into an array of that size
```

```
(You may assume that the 100 words are forthcoming, i.e., will appear)
```

```
--copies the words in pairs into an array of Pairs of size 50. For example, if the input were  
one two three four five six ...
```

```
then the first pair would be ("one", "two") and the second pair would be ("three", "four") ...
```

```
--uses the count method of Pair to print out how many of the pairs  
in the array match the pair containing your name.
```

```
*/
```

Use the front and back of the following two pages (if you need that much space) to write your program.

1. Which of the following statements is correct?
 - (a) Identifiers can use symbols such as ? or %.
 - (b) Identifiers can be made up of letters, digits, and the underscore (_) character.
 - (c) Identifiers are not case sensitive.
 - (d) Spaces are permitted inside identifiers.
 - (e) Only one identifier per class is allowed.

2. Which of the following counts the number of characters in a string?
String greeting = "Hello, World!";
 - (a) int n = greeting.count();
 - (b) int n = greeting.size();
 - (c) int n = greeting.length();
 - (d) int n = greeting.number();
 - (e) None of the above

3. Which of the following statements is correct about the following code?

```
String x = "hello";
String y = "jello";
x = y;
int z = 3;
int w = z;
```

 - (a) The variables x and y both refer to the same object.
 - (b) The variables z and w both refer to the same object.
 - (c) z, w, x, y are examples of reference variables.
 - (d) z, w, x, y are examples of variables of primitive type.
 - (e) All of the above.

4. What prevents the the following method (which is not a constructor) from compiling?
- ```
public empty() {
}
```
- (a) the empty parameter list  
(b) the reserved method name  
(c) the empty body  
(d) the missing return type  
(e) none of the above (it compiles)
5. The process of “hiding” object data and providing methods for data access is called:
- (a) Virtualization (b) Encapsulation (c) Documentation (d) CMC (e) Abstraction
6. The following are initialized with a default value when you do not explicitly set them in a constructor:
- (a) Object variables  
(b) Primitive variables  
(c) Parameter variables  
(d) Local variables  
(e) Instance fields
7. Suppose a tester program MyClassTester (for testing MyClass) produces this output.
- ```
1500  
Expected: 2000
```
- What is the cause for the error?
- (a) A compilation error
(b) An error in the implementation of MyClass
(c) An error in the implementation of MyClassTester
(d) An error in either MyClass or MyClassTester
(e) None of the above

8. What is printed in the following?

```
System.out.println(23 / 5);
```

- (a) 5 (b) 4 (c) 3 (d) 4.6 (e) None of the above

9. Based on the following code fragment, what is the value of **discountedPrice**?

```
double price = 15.00;  
double discount = 1.95;  
double discountedPrice = price - discount;
```

- (a) exactly 13
(b) exactly 13.05
(c) approximately 13.05
(d) exactly 13.04
(e) none of the above--the code fragment has an error

10. Which of the following statements is equivalent to:

```
balance = balance + amount;
```

- (a) balance == amount;
(b) balance += amount;
(c) balance =+ amount;
(d) balance +== amount;
(e) balance++;

11. A constant is declared with which of the following keywords?

- (a) void
(b) static
(c) final
(d) int
(e) const

12. A student's rank is 1 if the gpa is at least 3.5. The rank is 2 if the gpa is at least 3.0. Otherwise rank is 3. Which of the following statements computes the rank correctly?

(a) if (gpa >= 0) rank = 3;
 else if (gpa >= 3.0) rank = 2;
 else rank = 1;

(b) rank = 3;
 if (gpa >= 3.0) rank = 2;
 else if (gpa >= 3.5) rank = 1;

(c) if (gpa >= 3.5) rank = 1;
 if (gpa >= 3.0) rank = 2;
 rank = 3;

(d) if (gpa >= 3.5) rank = 1;
 else
 {
 if (gpa >= 3.0) rank = 2;
 rank = 3;
 }

(e) None of the above.

13. The careful programmer:

- (a) designs the code so well that test cases are not required.
- (b) never makes a mistake.
- (c) collaborates with a test engineer who takes care of testing.
- (d) designs test cases when the code is complete.
- (e) designs test cases before writing the code.

14. What is the output from the following code fragment?

```
String a = "boo";  
String b = "b" + "oo";  
System.out.println(a == b);
```

- (a) true (b) false (c) a == b (d) boo == boo (e) None of the above

15. If a loop is executed for a definite number of times, a(n) _____ loop is usually appropriate.

- (a) random (b) nested (c) infinite (d) for (e) recursive

16. What does the following code fragment output?

```
sum = 0;
for (i = 1; i <= 10; i++);
    sum = sum + i;
System.out.println(sum);
```

- (a) 0
(b) 1
(c) 11
(d) 54
(e) 55

17. What is the output from the following code fragment?

```
for (int i = 0; i < 3; i++) {
    for (int j = 0; j < i; j++) {
        System.out.print("*");
    }
    System.out.println();
}
```

- (a) *
**

(b) ***
**
*
(c) ***

(d) *****
(e) None of the above

18. Which of the following loops may cause “infinite” looping?

- (a) `for (int i = 1; i <= n; i++) { }`
- (b) `for (int years = n; years > 0; years--) { }`
- (c) `for (int i = 1; i <= 10; i++) { }`
- (d) `for (int i = n; i < 10; i--) { }`
- (e) None of the above (all for loops are inherently safe)

19. Suppose **data** is a 2D array. The number of rows is given by:

- (a) `data[0]` (b) `data.length()` (c) `data.length` (d) `data[0].length` (e) None of these

20. Which of the following statements is **true**?

- (a) You cannot insert an object in the middle of an array list.
- (b) Array lists can contain elements of primitive type.
- (c) The length of an array list cannot be changed.
- (d) You must specify the size of an array list when you construct it.
- (e) None of the above (all above statements are false)

21. What does this code fragment return (assuming that **accounts** is an array list of BankAccount objects)?

```
BankAccount b = accounts.get(0);
for (int i = 1; i < accounts.size(); i++)
{
    BankAccount a = accounts.get(i);
    if (a.getBalance() > b.getBalance())
        b = a;
}
return b;
```

- (a) The value of the smallest balance
- (b) The bank account with the largest balance
- (c) The bank account with the smallest balance

- (d) The value of the largest balance
- (e) None of the above

22. When designing classes, a rule of thumb is that a class name should be

- (a) noun
- (b) verb
- (c) adjective
- (d) adverb
- (e) preposition

23. A(n) _____ field belongs to the class, not to any object of the class.

- (a) instance
- (b) protected
- (c) private
- (d) public
- (e) static

24. What does the following code fragment output?

```
public static void makeDeposit(BankAccount b)
{
    b.deposit(100);
}
```

```
public static void makeWithdrawal(BankAccount b)
{
    b = new BankAccount(0);
}
```

```
public static void main(String[] args)
{
    BankAccount x = new BankAccount(1000);
    makeDeposit(x);
    System.out.print(x.getBalance());
    makeWithdrawal(x);
    System.out.println(" " + x.getBalance());
}
```

- (a) 1100 1100
- (b) 1000 1100
- (c) 1100 0
- (d) 1000 0
- (e) 1000 1000

25. If many classes of a program depend on each other, then coupling between classes is

- (a) insignificant
- (b) low
- (c) redundant
- (d) cohesive
- (e) high