Name: _____

Term Test 1 A (14F)

Instructions (Read These):

- **Starting the test before permission has been given will result in an immediate zero. Everyone starts at the same time once everyone is seated.**
- **Turn mobile phones / mobile devices off**
- **Remove all papers, books, laptops etc. from the desks**
- **Using any electronic device – laptop, mobile phone, PDA, calculator during the test will result in immediate zero**
- **Strictly no talking for any reason during the test or you get zero, unless to ask the professor a question If you complete your test early, do not talk to friends who are still taking the test.**
- **Write your name at the top of the test document on page 1 and at the end for part 2, as well as on the Multiple Choice Answer Sheet.**
- **Assume code samples shown will run / compile as part of a larger code listing, unless there is an option provided "does not compile" or similar for a possible answer**
- **All questions are within the context of Java, and computer programming**
- **If you see what you think may be a mistake raise your hand and ask quietly when I reach you**
- **Please do not leave the room during the first 30 minutes of the test.**
- **All test materials must be returned at the end of the test**

Additional Notes:

(**No Calculators allowed**)

The test is in two parts, Part 1 is multiple-choice questions, and Part 2 is short answer.

Place your answers for Part 1 onto the provided answer sheet, only the answer sheet will be used for grading Part 1

Note: Make sure your handwriting is readable; I suggest using upper case letters ensuring that D looks different from B.

Answer Sheet is the last page of this test, please detach and sign your name to it.

Place your answers for Part 2 into the spaces provided. If you need more room clearly note that your answer is continued on extra paper, and on the extra paper clearly indicate what question you are continuing.

There is an extra blank page at the end of the test you can detach to use as scrap paper, remember to return all sheets at the end of the test, including scrap paper.

Ensure that your name is on all parts of the test:

- Multiple Choice answer sheet
- The test (this document)
- Any extra sheets you detach

Total Test Time will be 1hour and 50 minutes

Part 1 Multiple Choice: Each question is worth 2 percent; there is only one correct answer per question.

1. The .class extension on a file means that the file
   a. contains Java source code.
   b. contains HTML code produced by the javadoc tool.
   c. is produced by the Java compiler (javac).
   d. is produced by the Java Virtual Machine (java).

2. Which of the following declarations results in the creation of a reference type in memory?
   a. int reference = 0;
   b. String s = "reference";
   c. reference int = 0;
   d. boolean reference = false;

3. Which one of the following Java keywords is used to declare constants (ie variables whose values cannot be changed)?
   a. const
   b. constant
   c. final
   d. static

4. When should a program explicitly use the this reference?
   a. When accessing a private variable.
   b. When accessing a public variable.
   c. When accessing a local variable.
   d. When accessing a field that has the same name as a local variable.

5. What is the result of the statement a = b below?

```
int [] x = new int[3];
int [] y = new int[5];
x = y;
```

   a. The program will not compile: x and y are different in size
   b. The assignment x[4]=5; will cause the program to crash at run-time
   c. The array object referenced by y will be collected by the garbage collector
   d. The array object referenced by x is the same array object referenced by y

6. Why does the following code result in a NullPointerException when the program is run:

```
Student [] students = new Student[200];
students[0].setFirstName("a name");
```

   a. The array declaration was too small
   b. There is no index zero, i.e. `[0],` for arrays in Java
   c. Arrays of references have every element initialized to null by default.

7. The purpose of a constructor is to
   a. Initialize a new object's data fields.
   b. Initialize a new object's methods.
   c. Create a new class.
   d. None of the above

8. When is memory for a class allocated?
   a. When the class is coded.
   b. When an object of the class is declared.
   c. When method main starts to execute
   d. None of the above

9. Given the following statements, what is stored in newValue:

```
int i = 1;
int newValue;
int [] nums = {5, 10, 15, 20};
newValue = nums[i+2] + nums[i+1]/3;
```

   a. 0
   b. 18
   c. 15
   d. 25
   e. None of the above

10. Which of the following is true about a primitive variable:
    a. It holds the raw machine-code address of a variable
    b. Primitives are close to the machine-code level, thus have different byte sizes on different hardware platforms.
    c. The value stored in the variable is an actual value (as opposed to a reference)
    d. None of the above

11. Two methods are called overloaded if they have:
    a. Same method names, same number and type of parameters
    b. Different method names, different number and type of parameters
    c. Different method names, same number and type of parameters
    d. Same method names, different number and/or type of parameters

12. Why is the following code sample not an example of method overloading?

```
public class Printer{
    public void print(String a){ System.out.println(a); }
    public void print(String b){ System.out.println(b); }
    }}
```

    a. The methods are both public and void
    b. The methods have the same name
    c. The parameter of each method has the same data type
    d. The parameters needed to use the same variable names

13. What will result from the given code segment?

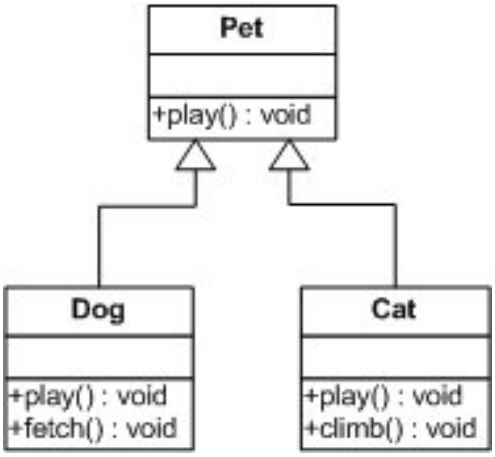
```
String name1 = new String ("AAA");
String name2 = name1;
name1 = new String ("AAA");
if (name1 == name2)
    System.out.println ("names are equal");
else
    System.out.println ("names are not equal");
```

a. names are equal will be displayed
b. names are not equal will be displayed.
c. Code will not compile
d. None of the above

14. Given `String name = "abc 123";` What is the value returned by `name.length()`?
a. 6
b. 7
c. 8
d. 9

15. Given `String name = "abc 123";` can we execute `name = "bean fish";` ?
a. Yes - the reference value for the literal "bean fish" is copied into name (which is a reference to a String).
b. No - the size of the String is fixed when it is created and "bean fish" is too big.
c. No - Strings are immutable, hence cannot be changed.
d. None of above

Question 16 on next page



16. The declaration of the class Dog (from the UML diagram above) would be:
    a. public class Dog implements Pet{…}
    b. public class Dog extends Pet {…}
    c. public class Pet extends Dog {…}
    d. none of the above

17. Given the declaration Cat a = new Cat(); what line of code below will crash the program at run time?
    a. Pet x = a;
    b. Cat y = (Cat)a;
    c. Dog z = (Dog)a;

18. Which of the following statements is true
    a. Pet is called a superclass
    b. Pet is called a subclass
    c. Dog and Cat are called superclasses

19. Class Pet has been declared as an abstract class. This means:
    a. All methods in Pet class must be declared in Dog and Cat classes
    b. All methods in Pet class have no code
    c. Objects of type Pet may NOT be instantiated directly
    d. Objects of type Pet may be instantiated directly

20. Which of the following is an application of the principle of inheritance:
    a. An object of class A has a reference to class B object
    b. Several methods have the same name, but have different signatures.
    c. Fields are usually declared private.
    d. All classes are ultimately derived from the superclass called Object
    e. None of the above

21. The keyword that will prevent a method from being overridden in a subclass is
    a. protected
    b. abstract
    c. static
    d. final

22. Which line of code below will declare a 2 dimensional array that will be able to reference 30 Square objects?

a. `Square battlefield = new Square[5][6];`
b. `Square[][] battlefield = new Square(5)(6);`
c. `Square[][] battlefield = new Square[5][6];`

23. Given the array initialization shown, what value is stored at `values[1][2]`?

```
int[][] values = { { 1, 2, 3} , {6, 5, 4} };
```

a. 2
b. 5
c. 4

24. What is wrong with the code sample below?

```
public class Hybrid3 {
    public static void main(String[] args){
        double count = 0.1;
        while(count != 1.0){
            System.out.println(count);
            count += 0.1;
        }
    }
}
```

a. It will not compile
b. The program when run is an infinite loop
c. While loops don't work with double data types

25. Which constructor call below will chain a call to an overloaded constructor in the same class Name, with String fields: first, middle, last?

a. `public Name(){ this("first", "middle", "last"); }`
b. `public Name(){ super("first", "middle", "last"); }`
c. `public Name(){ Name("first", "middle", "last"); }`

26. The top-most super class for Exceptions and Errors in Java is:

a. Throwable
b. Exception
c. Error
d. RunTimeException

27. Subclasses of _____ represent critical problems and you should not attempt to have your program recover.

a. Throwable
b. Exception
c. Error
d. RunTimeException

28. Subclasses of _____ represent **checked** exceptions.

a. Throwable
b. Exception
c. Error
d. RunTimeException

29. Which of the following Java keywords are typically used with exception handling?
    a. try
    b. catch
    c. finally
    d. throws
    e. throw
    f. all of the above

30. What will print out from the following code sample?

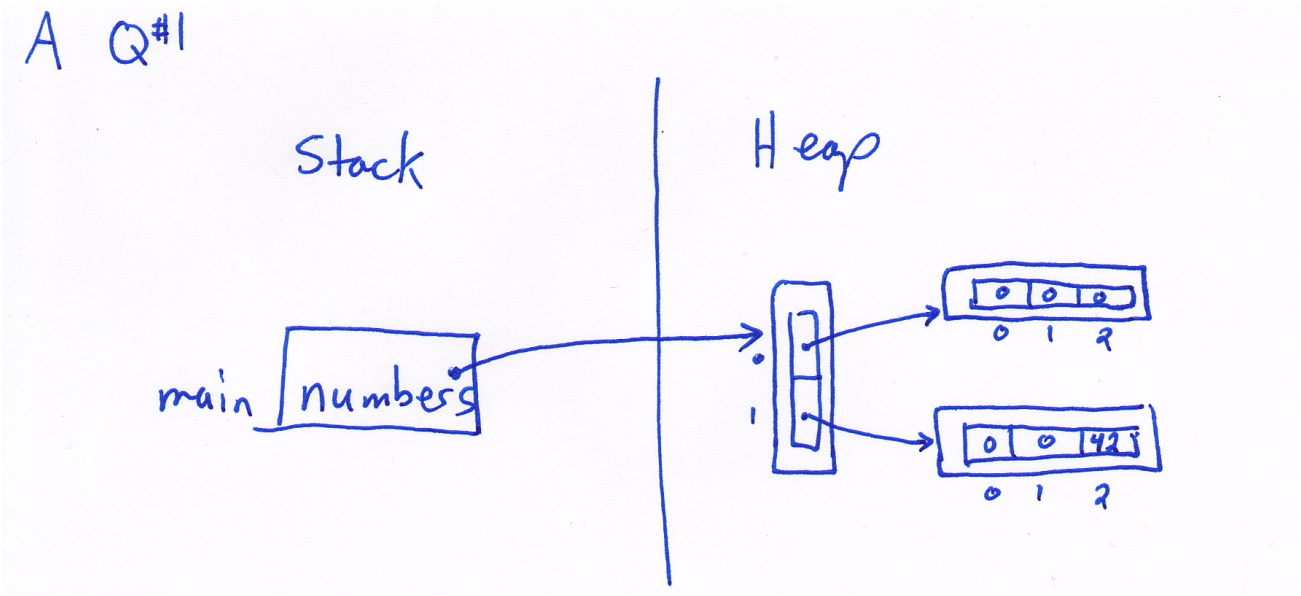
```
public class Misc {
    public static void main(String[] args) {
        try{ System.out.print("Hello World"); }
        catch(Exception ex){ System.out.print("from catch"); }
        finally{ System.out.println("from finally"); }
    }
}
```

    a. Hello Worldfrom catch
    b. Hello from catch
    c. Hello Worldfrom finally
    d. Hello from finally

Part 2 Short Answer Questions (40%): 5 Questions, point values vary

Question1: Memory Map [5 Points]
Given the code sample below draw a memory map of the stack and heap

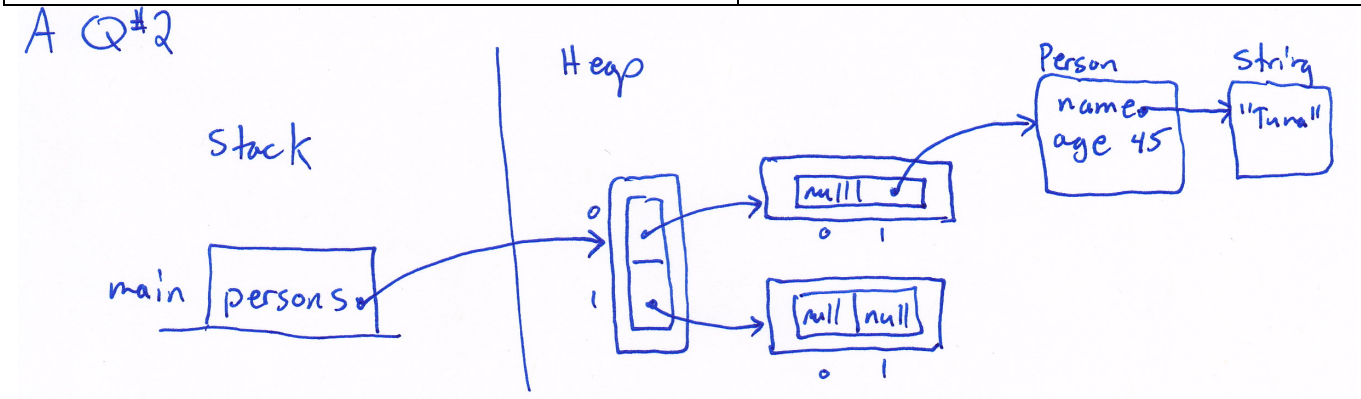
```
public class Question1 {
    public static void main(String[] args) {
        int[][]numbers = new int[2][3];
        numbers[1][2] = 42;
        // Draw memory map from this line
    }
}
```



Question2: Another Memory Map [7 Points]
Given the code sample below draw a memory map of the stack and heap

```
public class Question2 {
    public static void main(String[] args) {
        Person[][]persons = new Person[2][2];
        persons[0][1] = new Person("Tuna", 45);
        // Draw memory map from this line
    }
}
```

```
public class Person {
    private String name;
    private int age;
    public Person(){}
    public Person(String name, int age){
        this.name = name; this.age = age;
    }
}
```



Question3: Loops and 2D Arrays [12 Points in total]

Given the following array declarations, and class Person as a reference:

- Write a nested loop to print out all of the values within the numbers array [5 Points]
  - 4 values per line separated by spaces
- Write a nested loop to assign Person object references to each element of the persons array [7 Points]
  - Give each person the name "Unknown"
  - Set each Person objects age equal to the multiplication of the loop counters

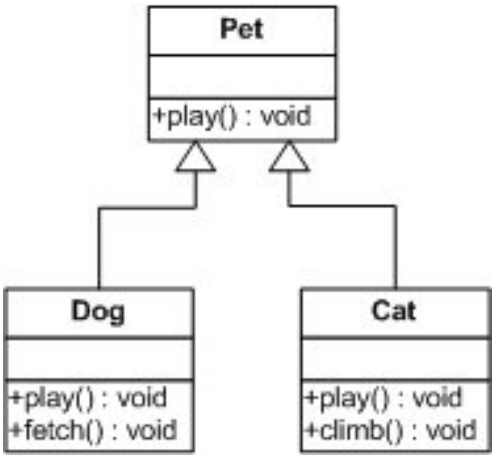
```
public class Question3A {
    public static void main(String[] args) {
        int[][] numbers = {{1,2,3,4},{5,6,7,8}};
        Person[][] persons = new Person[2][2];

// Your code would go here but use the space
// below
```

```
public class Person {
    private String name;
    private int age;
    public Person(){}
    public Person(String name, int age){
        this.name = name; this.age = age;
    }
    public String getName(){return name;}
    public void setName(String name){
        this.name = name;
    }
    public int getAge(){return age;}
    public void setAge(int age){this.age = age;}
}
```

```
        // loops to print numbers
        for(int row = 0; row < numbers.length; row++){
            for(int column = 0; column < numbers[row].length; column++){
                System.out.print(numbers[row][column] + " ");
            }
            System.out.println();
        }
```

```
        // loops to create Person objects
        for(int row = 0; row < persons.length; row++){
            for(int column = 0; column < persons[row].length; column++){
                persons[row][column] = new Person("Unknown", (row * column));
            }
        }
```

Question4: Inheritance and Polymorphism in two parts.



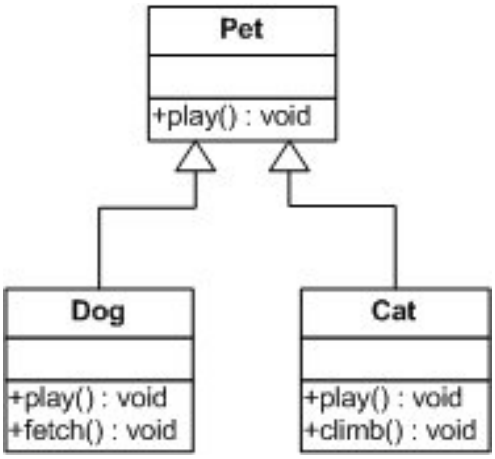

```
public abstract class Pet {

    public abstract void play();

}
```

Question 4: Part 1 [5 points]

- Write the code for the Dog class, overriding method play(), and providing a working fetch method
- Method play() should just output a line like "Dog plays fetch the ball"
- Method fetch() should just output a line like "Dog has fetched the ball"

```
public class Dog extends Pet{

	@Override
	public void play(){
		System.out.println("Dog plays fetch the ball");
	}

	public void fetch(){
		System.out.println("Dog has fetched the ball");
	}

}
```

Question4: Inheritance and Polymorphism in two parts. (Part 2)




```
public abstract class Pet {

    public abstract void play();

}
```

Question 4: Part 2 [7 points]

- Write code to create an array of pets with a size of 10
- Loop over the array and assign 5 cats to the first 5 elements, then 5 dogs to the next 5 elements
- Use an enhanced for loop to call method play() on each pet in the array

```
public class Question4Part2A {
    public static void main(String[] args){

            Pet[] pets = new Pet[10];
            for(int index = 0; index < pets.length; index++){
                  if(index < 5){
                        pets[index] = new Cat();
                  }
                  else{
                        pets[index] = new Dog();
                  }
            }

            for(Pet pet : pets){
                  pet.play();
            }
```

Question 5: Exception Handling [4 Points]

- The sample program prints multiplication tables but crashes if the user enters text instead of an integer.
- Add a try-catch so that although the program will exit (instead of crashing) it prints the following:
    - A user-friendly message, similar to "Please enter only numbers"
    - The message set by the system within the exception caught
    - A stack trace from the exception object
- Use the spaces provided for your code:
- Note: Catch the specific exception indicated in the import statements

```
import java.util.Scanner;
import java.util.InputMismatchException;
public class Question5A {

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
```

```
try{
```

```
        System.out.println("Please enter the number");
        int number = input.nextInt();
        for(int count = 0; count <= 10; count++){
            System.out.printf("%d * %d = %d %n",
                number, count, (number * count));
        }
```

```
}
catch(InputMismatchException ex){
    System.out.println("Please only enter numbers");
    System.out.println(ex.getMessage());
    // System.out.println(ex.getStackTrace()); // this is okay too
    ex.printStackTrace();
}
```

```
    } // end main
} // end class
```

Scrap Paper: Name _____

CST8132 14F Multiple Choice Question Answer Sheet: Term Test A

Note: Question numbers are vertical down the page

Full Name: _____

Question Number	Letter Answer
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Question Number	Letter Answer
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