Name: _____

Term Test 1 – Version A

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 Scantron 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**
- **You may 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:
The test is in two parts, Part 1 is multiple choice, and Part 2 is short answer.
Place your answers for Part 1 onto the provided Scantron sheet, only the Scantron sheet will be used for grading Part 1

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

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

- Scantron sheet (only your name is required),
- The test (this document)
- Any extra sheets you detach

Total Test Time will be 1hour and 30 minutes

Part 1 (60%) – Multiple Choice Questions – 20 questions (3% each)

1. Which of the following is a PDL keyword
   a. SEND
   b. GET
   c. REPEAT
   d. SWITCH

Memorization question

2. Using the PDL below what would be printed by a program?

```
number ← 10
IF number < 10
    PUT The value is less than 10
ELSE
    PUT The value is greater than 10
END IF
```

Number is 10, so the first part of the IF is skipped as the number < 10 is false.
The program enters the ELSE and prints the message indicated.

   a. Nothing will print
   b. The value is less than 10
   c. The value is greater than 10
   d. The value is equal to 10

3. Which of the following is a Java identifier that will compile?
   a. if
   b. first name
   c. bAdNaMe
   d. #number

if – this is a keyword cannot use keywords for identifiers
first name – contains a space, will not compile
bAdNaMe – looks horrible, but will compile
#number – cannot have # character in an identifier

   a. Which of the following identifiers best follows suggested naming guidelines for a Java variable?
   b. NUMBER
   c. NuMbEr
   d. number
   e. Number

Variables names in Java should start with a lower case letter

4. Multiple line comments in Java are outlined by what characters?
   a. \\ //
   b. /* */
   c. /& &/
   d. <!-- -->

Memory question

5. Which of the statements below correctly orders the data types based on the amount of memory they use, from largest (64 bits) to smallest (8 bits)?
   a. float, double, long, short, int, byte
   b. byte, int, short, long, double, float
   c. byte, short, int, float, long, double
   d. double, long, float, int, short, byte

Memory question:
Both double and long are 64-bit
both float and int are 32-bit, short is 16, byte is 8

6. Which of the following has the smallest numerical range, negative to positive numbers?
   a. byte
   b. short
   c. long
   d. int

Memory question

7. What data type does the literal value 5 default to in Java?
   a. int
   b. long
   c. float
   d. double

Memory question

8. What data type does the literal value 5.5 default to in Java?
   a. int
   b. long
   c. float
   d. double

Memory question

9. Will the following line of code work or result in a compiler error?

```
double x = 5 + 5 - 10;
```

   a. it will work
   b. it is a compiler error

All of the operands to the right of the assignment operator are int data type, the result from the math will also be of int data type. Java will convert the resulting int into a double automatically when assigning into x.

10. Will the following line of code work or result in a compiler error?

```
int x = 3 + 4 * 7.0;
```

   a. it will work
   b. it is a compiler error

7.0 is a double data type, when multiplying 4 * 7.0 the 4 is converted into a double first, and the result is a double. As the calculations proceed 3 will also be promoted (converted) into a double. Overall the result is double and the compiler will refuse to convert a double into an int. Does not compile

11. What will be assigned into variable num by the statement below?

```
int num = 22 / 11 + 3 * 3 - 1 - 2 - 3;
```

   a. 22
   b. 5
   c. -2
   d. 10

Division and multiplication before addition and subtraction, from left to right
So 22 / 11 first, then 3 * 3, then 2 + 9 – 1 – 2 – 3 resulting in 5

12. What will be the value of variable y after the statement below? - assume y has a starting value of 5

```
y *= 10;
```

   a. 5
   b. 50
   c. 500
   d. 42

Y *= 10 is short-hand for y = y * 10
The program will perform 7 * 10 first, y starts with 5 so: 5 * 10 is 50
50 is then assigned into the memory location represented by y, replacing the old value

13. What will print out from the code sample below?

```
int x = 0;
int y = 0;
int z = 0;
z = ++x + y++;
System.out.print(x);
System.out.print(" " + y);
System.out.print(" " + z);
```

a. 0 0 0
b. 1 1 1
c. 1 1 2
d. 1 2 3

All three variables start with 0
Prefix operator (++x) will make x into 1, and report 1 for the calculation
Postfix operator (y++) will make y into 1, but report 0 for the calculation
(0 was the starting value of y before the postfix was applied to it)
The equation then for z works like: z = 1 + 0
So all three variables will have values of 1 and this is what prints out

14. Given a Scanner variable input, what method below will read an int value from the console?

a. `double a = input.nextDouble();`
b. `double a = input.nextInt();`
c. `double a = input.getDouble();`
d. `double a = input.getInt();`

Part memory question, part numeric promotion
Input.nextInt() reads an int. Java will convert int values into double type automatically so the selected answer will work.

15. What value will be assigned to variable x after the statement below?

```
boolean x = ! (3 == 3 && 10 < 40 || 5 - 5 >= 5);
```

a. true
b. false

Arithmetic operators first, then comparison operators, then logic operators last. ! is outside of ( ) so the ! in this case will be absolutely last.
3 == 3 && 10 < 40 || 5 – 5 >= 5 becomes 3 == 3 && 10 < 40 || 0 >= 5 because (5 – 5 is zero)
3 == 3 && 10 < 40 || 0 >= 5 becomes:
true && true || false
operator && goes before || so true && true is true, meaning the equation is now true || false, so the result ends as true, but don't forget that we have ! (true), ! true is false.

16. What will print on screen as a result of the following if statement?

```
double pay = 1000;
int tax = 0;
if(pay <= 1000){
    tax = 0;
}
else if(pay <= 2000){
    tax = pay * 0.25;
}
else{
    tax = pay * 0.40;
}
System.out.println(tax);
```

a. 250
b. 200
c. 400
d. 0

Pay is 1000
Pay <= 1000 is true, so only the tax = 0; part is used.
The else if and else sections are skipped.
Printout for tax is 0

17. What value will be output to the console by the code below?

```
int x = 0;
int y = 1;
switch(y){
    case 0:
        if(y == 1) { x = y++ * 3; }
    case 1:
        if(y == 0) { x = 10 + y--; }
        break;
}
System.out.println("x is " + x + ", y is " + y);
```

switch (y) matches case 1:
inside case 1:
y == 0 is false, so the if statement is skipped
the break statement is encountered and the program exits the switch
variables x and y are unchanged and print as 0 and 1

a. x is 0, y is 1
b. x is 3, y is 2
c. x is 11, y is 0
d. x is 12, y is 1

18. Given the code sample below, how would you change the 3rd line so that the program could compile?

```
double num = 42;
int answer = 0;
answer = num + 1;
```

a. (int) answer = num + 1;
b. answer = num + (int)1;
c. answer = (int)(num + 1);
d. (int) = answer + num + 1

Answers a and d do not have correct Java syntax
Answer b will not fix the problem, still will not compile
num is a double, so num + 1 results in a double, which needs to be cast explicitly to int before assignment into answer.
An alternative way to do this would be:
answer = (int)num + 1 // make nums value int before adding

19. What will be output to the console?

```
public class Tuna{
    public static void main(String[] args){
        char t = 'f';
        char u = 'i';
        char n = 's';
        char a = 'h';
        int count = 4;
        switch(count){
        default:
            System.out.print(t);
        case 1:
            System.out.print(u);
        case 2:
            System.out.print(n);
        case 3:
            System.out.print(a);
        }
    }
}
```

a) Fishy
b) fishy
c) tuna
d) fish

None of the case statements match 4, the value of count so default: is used.
There are no break; statements anywhere in the switch structure so once the program enterers the default: section it will fall-through each of the remaining cases. System.out.print() does not insert a \n at the end of the line so all letters will be on the same line.
Variable t contains 'f' so f prints first
Variable u contains 'i' so i prints second
Variable n contains 's' so s prints third
Variable a contains 'h' so h prints last
The output is fish

20. Which of the following steps of problem solving can have their orders reversed?

Step 1: Narrative Description of Problem	inputs / outputs / processing
Step 2: Algorithm Development	focus on the processing steps and refining them
Step 3: Pseudo code	PDL, Flow Chart, UML Activity Diagrams (PDL for this course)
Step 4: Test Plan	create a table of inputs / outputs / boundary cases (describe each case)
Step 5: Desk Check	Use the Test Plan (Step 4) to verify the Pseudo code
Step 6: Code and test the program	Translate the PDL into a Java program
Step 7: Install and maintain the program	Maintaining a program usually means to modify it when needed

a) Steps 1 and 2
b) Steps 3 and 4
c) Steps 4 and 6
d) Steps 1 and 7

Memorization question

Name: _____

Part 2

- 3 Questions. All questions use the same problem statement

Problem Statement

A pet-store owner would like a program that calculates the cost of dog food over a one-week period (7 days). The program should ask for the number of dogs in the store, and the cost per can for the food, and then calculate the weekly cost of the food. Each dog eats two cans of dog food per day.

Question 1 (10%) – Write the Algorithm solution for the problem statement.

Scrap paper work:
Identify the inputs, the given information, and the expected outputs from the word problem.
Inputs: number of dogs, cost per can
Given values: 7 days, 2 cans per dog per day
Output: total cost for food for one week, given the number of dogs and cost per can
Figure out the calculation: total cost = dogs * 2 * 7 * cost per can

Refined Algorithm:
Ask the user how many dogs are in the store
Ask the user how much each can of dog food costs (we assume every can costs the same)
Total cost = number of dogs * 2 (cans) * 7 (days) * cost per can
Display the total cost on screen

Name: _____

Problem Statement

A pet-store owner would like a program that calculates the cost of dog food over a one-week period (7 days). The program should ask for the number of dogs in the store, and the cost per can for the food, and then calculate the weekly cost of the food. Each dog eats two cans of dog food per day.

Question 2 (15%) – Write the PDL solution for the problem statement.

```
Start Food Calculator Program
   PUT Please enter the number of dogs in the store
   GET dogs
   PUT Please enter the cost for one can of dog food
   GET cost
   total ← dogs * 2 * 7 * cost
   PUT the cost for 7 days of dog food is
   PUT total
End Food Calculator Program
```

Name: _____

Problem Statement

A pet-store owner would like a program that calculates the cost of dog food over a one-week period (7 days). The program should ask for the number of dogs in the store, and the cost per can for the food, and then calculate the weekly cost of the food. Each dog eats two cans of dog food per day.

Question 3 (15%) – Write a Test Plan to test your solution to the problem statement.

- You are only required to provide three valid cases and three invalid cases in the test plan.

Number of dogs	Cost per can	Total cost for 7 days	Description
1	0.5	7	Normal Case
1	1	14	Normal Case
2	1	28	Normal Case
abc			Invalid input for dogs
1	abc		Invalid input for cost
0.5			Invalid input for dogs

There are other possible invalid cases; I was looking for 3 valid and 3 invalid cases.

Scrap Paper

Name: _____