APCS :: HW 2 – Worksheet and Quiz Prep.

This worksheet covers the following things which you should know for quiz 1:

- **Algorithms**: Know the definition; be comfortable with some level of formality in writing down your thoughts.
- **Variables**: know the defN; know how to declare variables properly with data types and how to assign and get values.
- **Fundamental Data Types vs. Object Data Types**
  - **Int, Double**: know the def of int. Know the difference between these two data types especially with respect to how arithmetic is computed with them.
- **Operators** {=, +/-, *, /, %}: Know the def of the assignment operator “=”; know how the basic arithmetic operators work. Pay special attention to division on the int data type.
- **Simple I/O programs**: Know how to print a line of text to the console window including variables as well; know how to construct and use a Scanner object to receive input.

1.) (5 points) Consider the following way to write the FindSmallest card algorithm we covered in class. It is the same procedure, but the wording is a bit more “code-like.”

**Input**: A list S of n playing cards  
**Output**: the value of the smallest card in S  

**Notation:**  
Let S[i] indicate the card at the ith position in S.

**FindSmallest**
1. int smallest = S[0];  
2. int i = 1;  
3. while( i < n ) {  
4.   if( S[i] < smallest ) {  
5.     smallest = S[i];  
6.   }  
7.   i = i+1  
8. }  
9. return smallest;

Try writing the BigDiff algorithm (explained below) in the same style as FindSmallest shown above:

**Input**: A list S of n playing cards  
**Output**: The biggest absolute difference between any two adjacent cards

**Example**: If S contains the following 8 cards: 5 8 1 2 3 5 7 9  
The algorithm should output ‘7’ since the absolute difference between 8 and 1 is 7.  
Note, if the positions of 8 and 1 were flipped the output would still be ‘7’.

**BigDiff**
1. int maxDiff = 0;
int tempDiff;
int i=1;
while( i < n ){
    tempDiff = S[i] = S[i-1];
    if(tempDiff < 0){
        tempDiff = -tempDiff;
    }
    if(maxDiff < tempDiff){
        maxDiff = tempDiff;
    }
    i = i + 1;
}
return maxDiff;

2.) (3 points) Write down the values of the variables after all the following code has been executed:

```java
int a = 10;
int b = 5;
b = a;
int c = a*a;
c = c + b*b;
```

```
A: 10  B: 10  C: 200
```

3.) (4 points)
```java
int a = 5;
double b = 2.5
double c = a * b;
double d = a / b;
```

```
A: 5  B: 2.5  C: 12.5  D: 2.5
```

4.) (3 points)
```java
int a = 5;
int b = 2;
int c = a / b;
int d = a % b
```

```
A: 5  B: 2  C: 2  D: 1
```

5.) (5 points) Fill in the main program below that converts degrees Celsius to Fahrenheit. Each comment in the program below is meant to guide you; write a line of code below each comment so that the program works as specified. NOTE: °F = °C × 1.8 + 32

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

    // construct and instantiate a new Scanner object
    Scanner S = new Scanner(System.in);

    // print message that prompts user for degrees C
    System.out.println("Enter degrees C: ");

    // get input from Scanner and put it into a variable
    double c = S.nextDouble();

    // convert the input into Fahrenheit and
    // put it into a new variable.
    double f = c * 1.8 + 32;

    // Print a final output message showing the conversion
    System.out.println(c + " deg. C. = " + f + " deg. F");
}
}