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Java Cheat Sheet

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1 Java: General Things to Remember

1. All code must be inside of a class definition (except import and package statements).
2. Every line of code must end with a semi-colon. This excludes lines that formulate "blocks", like if(), while(), or class declarations.
3. The name of the class in a file must match the name of the file. For example, "public class LinkedList" must be in a file called "LinkedList.java"
4. Classes can contain a method "public static void main(String[] args)" as an entry point to the whole program.
5. Whitespace does NOT matter in java. The compiler will completely ignore all whitespace.

2 Primitive Data Types

The primitive variable types are:

```
int x = 5; //integers
double d = 3.4; //decimal values
char c = 'h'; //characters. Use single quotes.
boolean b = false; //true or false

/* Other much less commonly used */
byte b = 24b;
short s = -8s;
long l = 2000000;
float = 4.567;
```

Some examples of using these data types include:

```
int x;       //automatically set to 0 by default
x++;         //increment integer by 1
x--;         //decrement integer by 1

int z = 14;

int total = (x + z) * x;     //expressions
int remainder = x % z;       //remainder after x / z

/* Boolean operators */
boolean b1 = false;
boolean b2 = true;
boolean result;

result = b1 && b2;  //logical AND
result = b1 || b2;  //logical OR
result = !b1;       //logical negation
```

3 Input Output

Input from the keyboard can be done like this:

```
Scanner in = new Scanner(System.in);     //make a scanner object
int x = in.nextInt();                    //read int from keyboard
double y = in.nextDouble();              //read double from keyboard
float f = in.nextFloat();                //read float from keyboard
boolean b = in.nextBoolean();            //read bool from keyboard
long l = in.nextLong();                  //read long from keyboard
String s = in.next();                    //read string from keyboard
```

Input from a file can be done like this:

```
BufferedReader in =
                new BufferedReader(new FileReader("inputfile.txt"));
String text = in.readLine();    //reads the next line
in.close();
```

Output to the console is done like this:

```
//prints text concatenated with x
System.out.print("The answer is " + x);

//prints and moves cursor to next line
System.out.println("something else");
```

Output to a file can be done like this:

```
PrintWriter outFile =
                new PrintWriter(new FileWriter("outputfile.txt")));
outFile.print("Hello ");
outFile.println("world");
outFile.close();
```

4 Strings

Strings are reference types in Java (so they are NOT primitives).

```
String s1 = "Hello";            //example string
String s2;                      //"" empty string by default
String s3 = new String("Hi");   //Also makes a string
```

Common operators on strings include:

```
String result;

result = s1 + s2;   //"hi " + "there" = "hi there"
s1.length();        //returns length of string
s1.charAt(2);       //accesses the char at position 2 (indexed from 0)
s1.substring(1,3);  //part of string starting at index 1, length 3
s1.equals(s2);      //compare strings using this structure
s1.toUpperCase();   //returns the string as all uppercase
s1.toLowerCase();   //returns the string as all lowercase
```

5 Converting Between Data Types

In Java, we often need to convert between different types of variables. Here are some common conversions:

```
/* int (or any other primitive) to string */
int x = 5;
String s = "" + x;  //"" + variable concatenates as a string

/* String version of number to int or double */
int i = Integer.parseInt("123");         //converts string "123" into intege
double d = Double.parseDouble("3.14")    //converts string "3.14" into doubl

/* dividing integers does integer division */
int x1 = 3;
int x2 = 5;
double result = x1 / x2;             // 3/5=(int)0.6 = 0
result = (double)x1 / (double)x2;    //0.6

/* double to int */
double x = 3.467;
int y = (int)x;      //y is 3, decimal truncated
```

6 Arrays

Three primary ways to instantiate arrays:

```
double[] dArray = new double[5];     //know the size, but not contents
int[] oddNumbers = {1,3,5,7,9};      //know the contents already

int x;
/* Stuff here */
String[] sArray = new String[x];     //use variable to intialize array

int[][] = new int[5][4];             //two-dimensional array
```

Some common things we do with arrays include:

```
x[3] = 5;   //Access array at position 3, set to 5.
x.length;   //get the number of elements in array

/* How to loop through an array */
```

```
for(int i=0; i<x.length; i++){
    System.out.println(x[i]);
}
```

7 Java Math Library

Java contains several functions inside the Math class that are useful. Among them:

```
Math.abs(x);              //absolute value of x
Math.max(a,b);            //larger of a and b
Math.min(a,b);            //smaller of a and b
Math.sin(theta);          //sin trig function
Math.cos(theta);          //cos trig function
Math.tan(theta);          //tangent trig function
Math.toRadians(deg);      //convert deg to radians
Math.toDegrees(rad);      //convert rad to degrees
Math.exp(x);              //raises e^x
Math.log(x);              //natural logarithm
Math.pow(a,b);            //raise a to power of b
Math.sqrt(a);             //square root of a
Math.E;                   //value of constant e
Math.PI;                  //pi
```