AP CSA

APCSA

Mead®
Learn. Organize. Create.

1 SUBJECT

WIDE RULED

Spiral® NOTEBOOK

70 SHEETS

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26.6 cm x 19.0 cm

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PRIMITIVE TYPES

EVERYTHING PASSED BYVALUE
→REFERENCES COPIED

ARITHMETIC EXCEPTION: Occurs when dividing by zero

Primitive Types —
- Int
- Char
- Double
- Boolean

↓ Doesn't inherit from object class

Declaration & Initialization : Type name = data;
OR
Tyne name;
name = data;

Math.random() returns random # between 0(inc) and 1(exc)

String " "ab Char ' ' Escape sequence \

Concatenation operator (+) outputs two values next to each other ≠ str.concat(str)

ORDER OF OPERATIONS: Parentheses
Typecasting
Mult - Div - Mod
Add - sub

STRINGS.

null ≠ " "
↓ \0 no ref
↓ ref to \0

str.substring (a, b)
- Index a included
- Index b not included

Sys.out.print calls toString()

str.substring (a). goes from a to end

CONDITIONALS.

- Condition must be inside ( )
- Short circuit evaluation
- Trace tables
- if (cond 1)
    exec if true
  else if (cond 2)
    execute if cond1 false and cond2 true
  else
    execute if cond 1 false and cond2 false

ORDER OF OPERATION
- parantheses
- equality operators
- &&
- ||

DEMORGAN'S LAW
- Applying ! two Bool expression reverses the truth value of each variable
  - && ⇄ ||
  - == ⇄ !=
  - > ⇄ <=
  - < ⇄ >=

ITERATION

- while loop runs while cond. is true
  ↳ WATCH INFINITE LOOPS
- For loop runs within range
- while & For interchangeable

GOTCHA FOR LOOP → Watch >= and > and <= and <
watch for 0 and 1 in it
test start case; test end case; test intermediate case

WRITING CLASSES

METHODS

- Must have return type
- overloading – same signature, different params
- Accessor methods – Get private instance variable
- Mutator methods – change private instance variables
- Pre condition – what method takes
- Post condition – result of method

MODIFIERS

- Static – one copy exists per class
- Final – immutable
- Public – accessible outside of class
- Private – only accessible inside of class
- this. → refers to calling object
- Instance variable should be private

- Instantiate object : class obj = new class constructor
- Constructor
  - First method called when object created
  - By default ~~void~~ no return val. – no return type specified
  - Must be public except singleton
- Static method can't call non static method or use instance variables
- Static method or variable called with Class name.

ARRAY

- Holds primitive and objects
- Continuous memory location
- Declaration: type[ ] name = new type [size]

  Initialization: name = {contents}
- type[ ] name = {contents}
- Access index with name[index]
- Length is a property

- Index starts at ∅
- Array Index Out Of Bounds exception - Trying to de ref index that doesn't exist in array
- Enhanced for loop - used to automatically go through each element of an array
  - can't change value - Concurrent Mod. Exception
- Null Pointer Exception - Trying to derefence null object

SEARCHES

SEQUENTIAL

- Go through each element sequentially
- Array doesn't need to be sorted.
-

BINARY

- Starts at center, moves left or right depending if value at center < or > target value
- Array needs to be sorted
- Worst case takes $\log_2(n)+1$
  n = num elements

SORTS

SELECTION

- Search & Swap
- Starts at first index, finds smallest value in remaining array and swaps the two then moves to second index and repeats

INSERTION

- compares first two elements of array and sorts them, then checks third index and inserts in right place relative to first & second index, continues process with rest of array

MERGE.

- Array is split and each subarray is sorted then subarrays are merged together
- Uses recursion

ARRAY LIST

- Linked list
- cannot hold primitives - use wrapper classes
- Typed can only hold one type of object
- Untyped can hold any type of object
- Declaration : Arraylist <type> arr ;
  Initialization : new ArrayList <type> ( );
  typed
  typed

- Arr.get(i)
- Arr.size[ )
- Arr.add (i, x)
- Arr.remove(i)
- Enhanced for loop cannot remove or change elements
- List = Arraylist

- when removing elements start from back
- Dynamically sized
- Must import Java.util.ArrayList

2D ARRAYS

- Array of arrays
- Declaration: Type[ ][ ] arr2;
- Initialization: arr2 = new Type[row][column]
- Access with arr2[#][#]

row column

INHERITANCE

- Child (subclass) inherits non private methods and data from parent (superclass).

HAS-A relationship

keyword extends

- IS-A relationship
- No multiple inheritance
  - Template / criteria for class] INTERFACE
  - keyword implements]
    - only static and final abstract methods
  - Abstract class
    - Can have non static, non final, 1 or more abstract methods
  - Neither Interface nor Abstract class can be instantiated
- Methods are inherited unless overwritten
- Call parent method or data with keyword super.

Child constructor must call super constructor as first statement in constructor

every~~thing~~ method in Java is by def. virtual

POLYMORPHISM

- Runtime determination of method to use
  - Fruit, apple, orange
- compiler may give error but will work at runtime

RECURSION

- Must have a base case ← Stack overflow
- Method calls itself
- Anything that can be done with recursion can be done by iteration
- 4 PILLARS

Inheritance Abstraction

Polymorphism Encapsulation (info. hiding)

ERRORS

compile-time - syntax, misspelling, prevent code from running

runtime ~~er~~ - prevent code from complete execution, ~~to~~ dividing by 0, √‾ etc.