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Problem Set: PS4

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Data Structures

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1.
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1: procedure ALGORITHM(int[]A)
2:     for i = 0 to A.length do
3:         for j = 0 to A.length do
4:             if (x[i] · 2) == x[j] then
5:                 print(x[i]);
```

The algorithm runs in $O(n^2)$ time

2. (a) Object $->$ Throwable $->$ Exception $->$ IOException

   (b) Object $->$ Reader(Abastract) $->$ BufferedReader

   (c) Object $->$ AbstractCollection(Abstract) $->$ AbstractList(Abstract) $->$ ArrayList

3. (a) IOException: 4 constructors available, new IOException(String message, Throwable cause);

   (b) BufferedReader: 2 constructors available, new BufferedReader(Reader in, int sz);

   (c) ArrayList: 3 constructors available, new ArrayList(int initialCapacity);

   (d) String: 15 constructors available, new String(byte[] bytes, int offset, int length, Charset charset);

4. (a) NullPointerException: NullPointerException happens when you call a reference object that has not had any values assigned in it, therefore calling the reference to print null, you could prevent this by putting something inside field in question before calling the object

   (b) FileNotFoundException: FileNotFoundException happens when a file reader cannot find the file of the name you passed into it, you can prevent this by making sure the file in question is in the same pacakge or that the file name you passed is correct

   (c) ArrayIndexOutOfBoundsException: ArrayIndexOutOfBoundsException happens when you call an index that does not exist in an array i.e. say you had an array of length 4 named 'A' and called A[5] this would throw an ArrayIndexOutOfBoundsException, make sure if you are looping through an array your base case is i < A.length not i ≤ A.length

   (d) IOException: IOException is any In Out errors that happen, they can be caused by a numerous amount of things and fixed by just as many

   (e) ClassCastException: This happens when you attempt to cast an object to a subclass that it is not an instance of