

**Homework 9**  
**CS411: Language Design and Implementation – C. David Shaffer**  
**Due: October 20, 2008**

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In the following questions assume that `a` is an Array object (of unknown size) containing only Integers. Also, assume `s` is a String created using a string literal (like `'hello there'`).

1. Write a single Smalltalk statement which creates an Array containing only the odd elements of `a`.
  
2. Write a single Smalltalk statement which evaluates to true if `a` contains a number which is not divisible by 5.
  
3. Write a single Smalltalk statement which evaluates to the number of **unique** entries in `a`. Hint: Look at the converting protocol in the `Collection` class.
  
4. Write a single Smalltalk statement which evaluates to true if `s` contains the substring `'xyz'`.
  
5. Repeat problem 4 but use a different method (Smalltalk method, that is).
  
6. Name two methods (give the class and method name) which create an `OrderedCollection`.

7. What type of object does the statement `5 @ 3` create?
  
8. What type of object does the statement `5 @ 3 extent: 6 @ 10` create?
  
9. Name three classes and methods within those classes that send the `extent:` message.
  
10. What type of object does the statement `5 / 3 + (10 / 7)` create? What is its value?
  
11. What is the modulus operator in Smalltalk?
  
12. Write a sequence of statements which evaluates to the number of direct subclasses that `Object` has.
  
13. Create an Array of all direct subclasses of `Object` whose names begin with 'Ab'.
  
14. What is the average number of lines in the methods in your image? Give the code that you used to find it.