

## CSE 341 — Ruby Discussion Questions — Solutions

1. What do the following Ruby expressions do?

```
x+2
```

This sends the message + to the object bound to x with the argument 2.

```
octopus.swim("fast")
```

This sends the argument swim to the object bound to octopus with the argument "fast" (a string)

```
octopus.swim "fast"
```

Same thing - parens optional for one-argument methods.

```
octopus.tentacles = 8
```

This sends the argument tentacles= to the object bound to octopus with the argument 8 (it looks like an assignment, but it's just a message send)

```
Aquarium.new("clownfish")
```

This creates a new instance of the class Aquarium. The argument "clownfish" is sent to the initialize method of the newly-created instance.

```
["clown", "fish"].each {|s| puts s}
```

This sends the each message to a 2-element array with the contents "clown" and "fish". The each message takes a block (in curly brackets). The result is that each string is printed.

```
[1,2,3].map { |j| j*10}
```

This sends the map message to the 3-element array with the elements 1,2,3. The map message takes a block, and returns a new array with the results from evaluating the block for each element. The result is [10,20,30]

```
sum=0
```

```
4.times {sum=sum+10}
```

The number 4 (an instance of Fixnum) gets the message times with the given block. The block is evaluated 4 times, so that sum becomes 40.

2. Write a Ruby class `Book`, which has fields for title and author. When you create a new instance of book you should give values for those fields. Also define getters (but not setters) for them. Finally, write a statement that makes a new instance of `Book` with a suitable author and title.

```
class Book
```

```
  def initialize(author, title)
```

```
    @author = author
```

```
    @title = title
```

```
  end
```

```
  attr_reader :author, :title
```

```
end
```

```
b = Book.new("Robert Heinlein", "Methuselah's Children")
```

3. Write a class `Delay` that implements delays (like the `delay` function in Scheme). The following code shows how it should work:

```
n = 0
d = Delay.new {n=n+1; 3+4}
d.force
d.force
v = d.force
e = Delay.new {1/0}
```

After we evaluate these statements `v` should be 7, but `n` should only be 1 (since we only evaluate the block once). Further, since we never force `e`, we shouldn't get a divide-by-zero error.

**Solution:**

```
class Delay
  def initialize(&p)
    @p = p
    @value = nil
    @unevaluated = true
  end
  def force
    if @unevaluated
      @value = @p.call
      @unevaluated = false
    end
    return @value
  end
end
```

4. Write a `min` method for the `Enumerable` mixin. You'll need to decide how to handle finding the minimum of an empty collection. Bonus points for handling this in the same way Ruby itself does!

**Hint:** look at the implementation of `map` at the end of the `inheritance.rb` handout.

```
def min
  m = nil
  each {|x| m = x if m.nil? or x<m}
  return m
end
```

5. Consider the class and module definitions in `self_super.rb` linked from the 341 Ruby web page. Suppose we define a class `C6` as follows:

```
class C6 < C1
  include M2
end
```

What is the result of evaluating these expressions?

```
>> x = C6.new
=> #<C6:0x35f520>
>> x.test1
in mixin M2 test1
=> nil
>> x.test2
in mixin M2 test2
in C1 test2
=> nil
>> x.kind_of?(C6)
=> true
>> x.kind_of?(M2)
=> true
>> x.kind_of?(M1)
=> false
>> C6.ancestors
=> [C6, M2, C1, Object, Kernel, BasicObject]
>> C6.superclass
=> C1
>> C6.superclass.superclass
=> Object
>> C6.superclass.superclass.superclass
=> BasicObject
>> C6.superclass.superclass.superclass.superclass
=> nil
```

6. {1=>"sam", 2=>"sue", 3=>"fred"}

```
7. words = ["squid", "octopus", "clam", "squid", "squid"]
   count = Hash.new(0)
   words.each {|w| count[w] = count[w]+1}
```

8. c = Cephalopod.new

```
>> c.class
=> Cephalopod

>> c.class.superclass
=> Animal

>> c.class.superclass.superclass
=> Object

>> c.class.superclass.superclass.superclass
=> BasicObject

>> c.class.superclass.superclass.superclass.superclass
=> nil

>> c.class.class
=> Class

>> c.class.class.class
=> Class
```