Algorithms

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**Quest Review** 

Week 5 Practice Problems

```
Calculate Average of list
script variables [Index] [sum] ( )
set index ▼ to 1
set sum ▼ to 0
repeat length of (list)
  set Sum v to (sum) + item (index) of (list)
 change index by 1
        sum) / length of (list)
report
```

```
DoubleSquare (list)
script variables [Index | CurrentNum] ( )
set Index ▼ to 1
repeat length of list
 set CurrentNum ▼ to item Index of numbers ▼
 replace item Index of numbers ▼ with
   CurrentNum + (CurrentNum)
 change Index v by 1
set Index ▼ to 1
repeat length of list
  set CurrentNum v to item Index of numbers v
 replace item Index of numbers ▼ with
   (CurrentNum) * (CurrentNum)
  change Index v by 1
```

```
are the numbers of (list) distinct?
script_variables [ walter || walker || current ||
set waiter v to 1
               (waiter) > length of list
repeat until
  set current v to item (waiter of list)
  set walker to (waiter) + 1
 repeat until
                 walker > length of (list)
            current = item (walker of list)
      say No, the numbers in the list are not distinct. for 1 secs
      stop block
    change walker by 1
  change waiter by 1
say Yes, the numbers in the list are distinct. for (1) secs
```

```
Mystery (num) (list)
script variables (min ) max | half | current | + >
set min ▼ to 0
set Max v to (length of list) + 1
repeat until (max) = (min) + 1
 set half to round (min) + (max) / 2
 set current to item (half) of (list)
        current) = (num)
   report (half)
  else
          (current) < (num)
     set Min ▼ to (half)
     set max ▼ to half
report 0
```

```
Are the elements of list list in the list list2
script variables (Index)
set index ▼ to 1
repeat length of (list)
           not
            Is the item (index) of (list) in the list (list2)
  if
            (use binary search)
    report (false)
  change index by 1
```

```
Mystery Func 2 list
script_variables [Index | size | result | Index2 |
set Index ▼ to 1
set result ▼ to 0
set size ▼ to length of list
repeat 15
 set result to result + item Index of list
 set Index2 v to 1
 repeat ( length of (list ) / (size) - 1
   replace item Index2 of list with Index2
 change Index by 1
report result
```

## **Quest Practice Problems**

# Reading Practice 1 (Q4.Sp11)

Blown to Bits begins with a story of Tanya Rider who was rescued after 8 days of being trapped in a car. The book says you're supposed to say it's a story about "bits." IN ONE SENTENCE, what were the specific bits that saved her life?

# Reading Practice 2(Q4a.Sp11)

Match the programming paradigms to the facts that are best-suited.

a) Functional

1) "What" not "How"

b) Imperative

2) Built through composition of blocks

c) OOP

3) Works via message passing

d) Declarative that, etc.

4) Like a recipe. Do this, then that, then

## Programming Practice 1 (Q3.F11)

Choose all that are not functions:

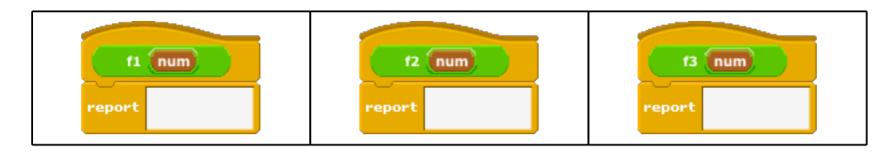
```
pick random 📗 to 📗
   length of 📗
 change 💌 by 📗
 item (any ▼) of 💽
```

# Programming Practice 2 (Q6.Sp11)

Question 6: Suppose we wish to compute the mathematical function f(x) = 7 \* (x - 5) \* (x - 5), and we have already been given the block definition on the right. Your job is to define the three helper blocks below so that is computed correctly. Each of the blocks below should perform at MOST one computation of the form



or Owner or You don't have to draw images of the blocks, just the expression, e.g., num + 99



## Programming Practice 3 (Q6a.F11)

The function **foo** is used in the following way (and you have no idea what **a**, **b**, or **c** are). What can you say about the *domain* and *range* of **foo**?



Domain of **foo** (first argument):

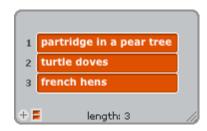
Domain of foo (second argument):

Range of **foo**:

Login: cs10-\_\_\_\_

#### Question 7:

You wish to author a command that takes as input a list of items, and has the sprite sing a song that describes what your true love gave you on that particular year (which, for year N, is N copies of the item in item N of the list, and all the things that were given last year). Example: If the list on the right were passed in as input, here's what song the sprite *should* sing to the user:



On anniversary # 1 of Valentine's day, my true love gave to me...

1 partridge in a pear tree

On anniversary # 2 of Valentine's day, my true love gave to me...

2 turtle doves

1 partridge in a pear tree

On anniversary # 3 of Valentine's day, my true love gave to me...

3 french hens

2 turtle doves

1 partridge in a pear tree

Whew! that's a lot of gifts!

Sing Valentines Day Song 🗏

a) What's the order of growth of

Unfortunately, we have a bug in the code on the right:

- b) Let's say we pass in the original 3-element list as input again. Indicate how the song above would change by crossing off whatever lines wouldn't be said (or changing them, or adding some, as necessary) in the box above.
- c) SIndicate(by writing directly on the code) a small change that fixes the bug.

```
Sing Valentines Day Song gifts

script variables | day | |

set day | to 1 |

set | v to day

repeat length of gifts

join On anniversary #

say join day of Valentines day, my true love gave to me... for 1

secs

repeat until | = 0 |

say join | join | item | of gifts | for 1 secs

change | v by -1 |

change day | by 1 |

say Whew, that's a lot of gifts! for 2 secs
```