

CS100J 12 April 2005
Arrays --sorting. Reading: 8.5

Quiz on Thursday: linear search, binary search, finding the minimum, dutch national flag

Please punctuate this:

Dear John, I want a man who knows what love is all about you are generous kind thoughtful people who are not like you admit to being useless and inferior you have ruined me for other men I yearn for you I have no feelings whatsoever when we're apart I can be forever happy will you let me be yours

Gloria

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This is a neat example of the ambiguity that English can cause, if not used properly! We try to use English properly and precisely, but ambiguity tends to creep in because of difference in cultures in which people grow up and simply because of differences of opinion. Read on!

Dear John:

I want a man who knows what love is all about. You are generous, kind, thoughtful. People who are not like you admit to being useless and inferior. You have ruined me for other men. I yearn for you. I have no feelings whatsoever when we're apart. I can be forever happy -- will you let me be yours?

Gloria

Dear John:

I want a man who knows what love is. All about you are generous, kind, thoughtful people, who are not like you. Admit to being useless and inferior. You have ruined me. For other men, I yearn. For you, I have no feelings whatsoever. When we're apart, I can be forever happy. Will you let me be?

Yours,
Gloria .

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- **Linear search. Vague spec.:** find first occurrence of v in $b[h..k]$.
Better spec.: Store an integer in i to truthify:
 postcondition: (0) v is not in $b[h..i-1]$
 (1) Either $i=k$ or $v = b[k]$
 invariant: v is not in $b[h..i-1]$
- **Finding the min. Vague spec.:** Find the min of $b[h..k]$
Better spec.: Precondition: $h \leq k$ (because an empty set of values has no min)
 Store in i to truthify:
 postcondition: $b[m]$ is the min of $b[h..k]$ (and it is first occurrence of the min)
 invariant: $b[m]$ is the min of $b[h..i-1]$ (and it is first occur. of the min)
- **Binary search: Vague spec.:** Look for v in sorted array segment $b[h..k]$.
Better spec.:
 Precondition: $b[h..k]$ is sorted (in ascending order).
 Store in i to truthify:
 postcondition: $b[h..i] \leq v$ and $v < b[i+1..k]$
 invariant: $b[h..i] \leq v$ and $v < b[j..k]$

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- **Dutch national flag. Vague spec.:** $b[0..n-1]$ contains only red, white, blue balls. Sort it using only swaps.

Better spec.: Precondition: $n \geq 0$

Permute $b[0..n-1]$ to truthify:

postcondition: $b[0..h-1]$ are red balls

$b[h..k-1]$ are white balls

$b[k..n-1]$ are blue balls

precondition:

0		n
?		

postcondition:

0	h	k	n
reds	whites	blues	

invariant:

0	h	k	j	n
reds	whites	?	blues	

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Partition algorithm: pre:

h		k
x	?	

inv:

h		i		j		k
x	$\leq x$?	$\geq x$			

post1:

h		j	i	k
x	$\leq x$		$\geq x$	

post:

h		i	x		k
$\leq x$		x		$\geq x$	

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Sorting:

pre:

h		k
?		

post:

h		k
sorted		

insertionsort inv:

h		i	?	k
sorted		?		

selectionsort inv:

h		i	?	k
$\leq b[i..k]$, sorted		$\geq b[h..i-1]$, ?		

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