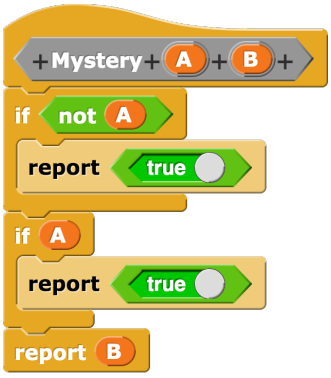
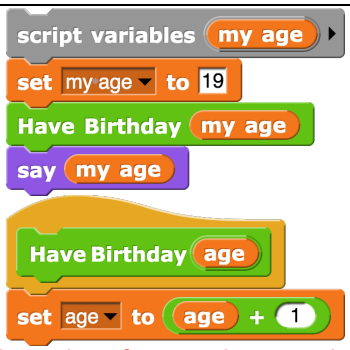
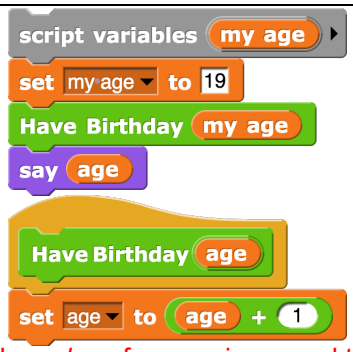
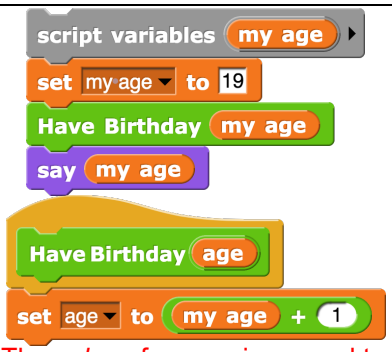
CS10 Spring 2018 Midterm 1 Answers



Question 1: Match each testing strategy with properties that describe it. **Unit**: Test your block in isolation according to spec. **Regression:** Run series of old tests after adding new feature. **Integration:** Test when you're putting it all together. **Black-box**: Test as if you have no idea what is inside. **Glass-box:** Test as if you wrote it yourself and know insides.

Question 2: If (the code on the right) reports **true**, what can you say about **A** and **B**? If **A** is false, **not A** is true, and the first **if** would trigger and it would return `true`. If **A** is true, the second **if** would trigger and it would return `true`. Therefore it returns true independent of A and B, therefore there's nothing we can say about A and B, so "None of these".

Question 3: *Which one will say 20?* The differences are only the **say** and final **set** blocks.

 The *value* of myage is passed to Have Birthday, and input age is given that value of 19. age is then set to 20 in Have Birthday but that has nothing to do with myage. The code says 19.	 The *value* of myage is passed to Have Birthday, and input age is given that value of 19. age is then set to 20 in Have Birthday but that has nothing to do with myage. age is only known I the scope of Have Birthday so the code hits an error.	 The *value* of myage is passed to Have Birthday, and input age is given that value of 19. age is then set to myage + 1 in Have Birthday but myage is not known in that scope since it's only a script (not global) variable, so the code hits an error.	None of these **None of them worked!**

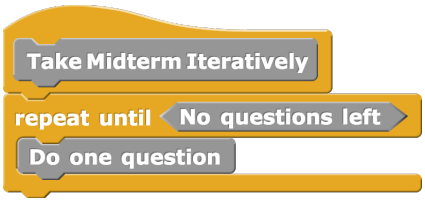
Question 4: Sometimes getting the most performance out of a parallel system is all about scheduling things to happen at the right time. Here's an example. A boy scout is supposed to walk four nice old ladies across a street. It takes the ladies **10**, **20**, **30**, and **50** seconds (respectively) to cross the street. Whenever two or more people are walking together, they have to walk at the speed of the slowest person in the group. **It takes the boy scout only 1 second to walk back on his own**. For all the calculations below, stop the timer the instant all four ladies have crossed; *don't count the time at the end it takes the boy scout to return back to his original side of the street*.

a) His scoutmaster has told him he can walk at most one person at a time. What's the fastest possible time to walk all the ladies across the street? 10 + 1 (go back) + 20 + 1 (go back) + 30 + 1 (go back) + 40 = **113**

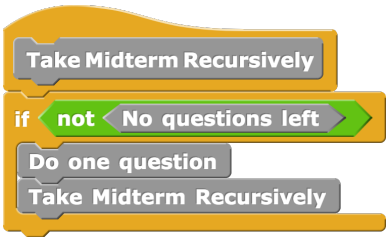
b) His scoutmaster now tells him he can walk at most *two people* at a time, one on each arm. Remember, he needs to walk at the speed of the slowest person he's walking with. *What's the fastest possible time to walk the all the ladies across the street?* Taking the two slowest at a time = 50 (for 30 & 50) then going back = 1 for the two fastest = 20 (for 10 & 20) = 50 + 1 + 20 = **71**

c) What if instead there were *two boy scouts who could each walk at most one person at a time*. *What's the fastest possible time to walk the all the ladies across the street?* One boyscout takes the 50 while the other takes the 20. At t=20 the fast boyscout walks back to get the 30. At t=50 the boyscout with the slowest lady walks back. At t=51, the 30 boyscout arrives and the 10 boyscout starts walking over, arriving at t = **61**.

d) Assume the old ladies have very kind manners and whenever they think they know the age of someone, and that person is older than them, they tell the boy scout that they won't start crossing until the older person crosses first. The problem is that their memories aren't so crisp and their memory of who is older is a little shaky. What could this result in? *Their preferences lead to the optimal and slowest possible crossing times. TRUE, they could lead you to the BEST and WORST solution; in (a) it's actually the same thing. Their preferences lead to it being impossible to get all or any of them across the street. TRUE – imagine if the ladies stood in a circle and thought the person to their right as older!*

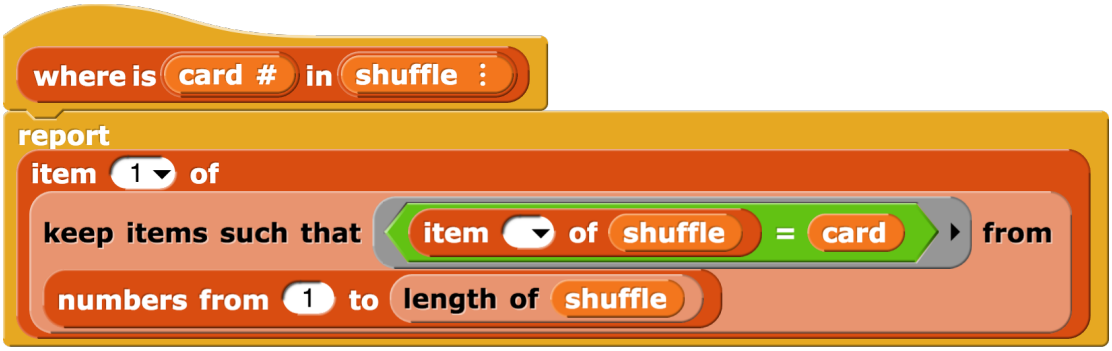


Question 5: Show us how to take an exam, *iteratively* and *recursively*.



Question 6: You have cards, numbered 1-N, which are shuffled (their order is scrambled), and placed into a list.

a) Fill in the circles to complete the block whose job is to report the index of a particular card in a shuffle. See code.



b) We change  to  . What would the block now do?

Returns the same value as before! The shuffle just changes the order that the values of the list are processed, but since only ONE of them will match, it doesn't matter which order we iterate through them. Cool, huh?