

**CS 4390/5353**  
**Quantum Computing**  
**Home Assignments 8–10**  
Due October 13, 2009

8. Show that Grover's algorithm works on an example when among 4 elements of an array, only one element satisfies the desired property. In class, we showed that Grover's algorithm works when the desired element is  $a[2] = a[10_2]$  and when the desired element is  $a[0] = a[00_2]$ . In this assignment, try one of the remaining cases.
  
9. Show that Grover's algorithm works on an example when among 4 elements of an array, exactly two elements satisfies the desired property: elements  $a[1] = a[01_2]$  and  $a[2] = a[10_2]$ .
  
10. (For extra credit) Show that Grover's algorithm works on an example when among 4 elements of an array, exactly three elements satisfies the desired property: elements  $a[0] = a[00_2]$ ,  $a[1] = a[01_2]$ , and  $a[2] = a[10_2]$ .