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**CS 540 HW4**

Q1:

1. h(b) can be from
2. iteration 1:   
   Pop A  
   OPEN: {B g(b) = ; h(b) = 100 ; f(b) =100 ; parent = A }  
    { C1 g(C1) = 1 ; h(C1) = ; f(C1) = 1 ; parent = A }  
   CLOSE: A{ f(A) = ; parent = null }  
   iteration 2:  
   Pop C1  
   OPEN: {B g(b) = ; h(b) = 100 ; f(b) =100 ; parent = A }  
    { C2 g(C2) = 1 ; h(C2) = ; f(C2) = 1 ; parent = C1 }  
   CLOSE: { A f(A) = ; parent = null }  
    { C1 g(C1) = 1 ; h(C1) = ; f(C1) = 1 ; parent = A }  
   iteration 3:  
   Pop C2  
   OPEN: {B g(b) = ; h(b) = 100 ; f(b) =100 ; parent = A }  
    { C3 g(C3) = 1 ; h(C3) = ; f(C3) = 1 ; parent = C2 }  
   CLOSE: { A f(A) = ; parent = null }  
    { C1 g(C1) = 1 ; h(C1) = ; f(C1) = 1 ; parent = A }  
    { C2 g(C2) = 1 ; h(C2) = ; f(C2) = 1 ; parent = C1 }  
   iteration 4:  
   Pop C3  
   OPEN: {B g(b) = ; h(b) = 100 ; f(b) =100 ; parent = A }  
    { C4 g(C4) = 1 ; h(C4) = ; f(C4) = 1 ; parent = C3 }  
   CLOSE: { A f(A) = ; parent = null }  
    { C1 g(C1) = 1 ; h(C1) = ; f(C1) = 1 ; parent = A }  
    { C2 g(C2) = 1 ; h(C2) = ; f(C2) = 1 ; parent = C1 }  
    { C3 g(C3) = 1 ; h(C3) = ; f(C3) = 1 ; parent = C2 }  
   iteration 5:  
   Pop C4  
   OPEN: {B g(b) = ; h(b) = 100 ; f(b) =100 ; parent = A }  
    { C5 g(C5) = 1 ; h(C4) = ; f(C4) = 1 ; parent = C3 }  
   CLOSE: { A f(A) = ; parent = null }  
    { C1 g(C1) = 1 ; h(C1) = ; f(C1) = 1 ; parent = A }  
    { C2 g(C2) = 1 ; h(C2) = ; f(C2) = 1 ; parent = C1 }  
    { C3 g(C3) = 1 ; h(C3) = ; f(C3) = 1 ; parent = C2 }  
    { C4 g(C4) = 1 ; h(C4) = ; f(C4) = 1; parent = C3 }
3. Based on the results from part be, we can see that the formula is , therefore
4. Because f(Ci) will never exceed 2 in this case so if h(B) is greater or equal to 2, the search algorithm will never pop B and therefore never be able to find an answer.
5. Yes. The range is . Because the f(Ci) will never exceed 2, so if h(B) is less than 2, the algorithm will be able to find an answer. Depend on the value of h(b), it may take a long time for the algorithm to find the answer.
6. It is a necessary condition for A\* to be able to ALWAYS find an optimal goal.

Q2:

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration Number | Current Point | Temperature | Probability |
| 1 | 2 | 1.8 | 0.5738(100% because successor is greater) |
| 2 | 3 | 1.62 | 0.2906 |
| 3 | 3 | 1.458 | 0.2537 |
| 4 | 1 | 1.312 | 0.1061(100% because successor is greater) |
| 5 | 4 | 1.181 | 0.1839 |
| 6 | 4 | 1.063 | 0.3903 |
| 7 | 4 | 0.957 | 1 |
| 8 | 4 | 0.861 | 0.313 |

Q3:

1. There are n! trees.
2. Its neighborhood cover of the total number of states
3. 25 miles = 40.2336 km  
      
   The inspector cannot finish the job in one day.