CSCI 405

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1.1 Design an algorithm that, given a collection of contact events and an incubation time T...

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studentContagion(T,x,y,S_a,S_b)
    S_a.contagious = T + x
    for(v ∈ V - {S_a}){
        v.contagious = ∞
    }
    for(t_k , S_i , S_j ∈ Event){
        if(t_k ≤ y){
            if(S_i.contagious = ∞ && S_j.contagious = ∞)

            if(S_i.contagious < ∞ && S_j.contagious < ∞)

            if(S_j.contagious < ∞ && S_i.contagious = ∞)
                if(S_j.contagious ≤ t_k)
                    S_i.contagious = T + t_k

            if(S_i.contagious < ∞ && S_j.contagious = ∞)
                if(S_i.contagious ≤ t_k)
                    S_j.contagious = T + t_k
    }
    if(S_b.contagious - T ≤ y)
        return true
 return false
```

Explanation:

The contact events are given in triples in order. This implies that the earliest times for contagion are able to be documented for each of the nodes. Whenever a student 'j' is in contact with an infected person 'i, this tells me that there is a time 'T' where they are contagious could spread to other students from the incubation period. This is dependent on the time 'T'. From this I also know the earliest time where student 'j' is contagious. If ∃ some path

of contagion from $S_a \rightarrow S_b$, this implies that the path is going to be taken in order of the rate of contagion. Alongside this, it's going to be taken as each of the nodes are going to have the earliest time of infection documented. After the earliest infection time for each of the nodes is documented, a check is performed at the end of algorithm studentContagion to see the time where S_b is going to be infected. i.e S_B.contagious - T $<$ than the stop time for the point 'y'.

The running time for this algorithm is O(m + n), as the contagion time for the nodes is in O(n) amount of time. Further, the documentation for the contagion time of the nodes occurs when scanning every edge 'm'.