CSE 331: Introduction to Algorithm Analysis and Design Fall 2011

HOMEWORK 10

Due Friday, December 9, 2011 in class by 1:15pm

Please submit each problem separately, i.e. each problem should begin on a new page and only the pages for one problem should be stapled together. Failure to do so might result in some problem(s) not being graded.

For general homework policies and our suggestions, please see the policy document.

This homework is longer than usual so start EARLY!

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1. ($10 + 10 + 20 = 40$ points) Exercise 1 (all three parts) in Chapter 6.

   Note: If you get confused by the language in part (c) that talks about running time being independent of the weight values recall that the running time for the weighted interval scheduling algorithm we saw in class also has running time independent of the magnitude of the values.

   Hint: For part (c), don't directly try to apply the weighted interval scheduling problem. Instead use the same design principle as we used to come up with the dynamic program for the weighted interval scheduling problem: i.e., come up with a recursive definition and then observe that only polynomially many values need to be computed and stored. (This hint is also valid for part (b) in the next question.)

2. ($20 + 25 = 45$ points) Exercise 2 in Chapter 6.

   Hint: For part (b) convince yourself that one should always schedule a job on the last day and then use it. (BTW in your homework, you will also have to convince Jesse/Jiun-Jie why you are convinced if you choose to use the hint, i.e. just using the hint as given will result in loss of points.)

3. (15 points) In the divide and conquer algorithm for finding the closest two points, we saw that if two points in S were $< \delta$ apart then they could be at most 15 positions apart in S_y.[1] Come up with a number $\alpha < 15$ and prove that the result above still holds if one replaces 15 with α

   Note: To get *any* credit your proof must work for some $\alpha \leq 12$. To get full credit, your proof must work for some $\alpha \leq 10$.

   Hint: It might be useful to define concretely what happens when a point is *on* one of the lines at $x = x^*$, $x = x^* - \delta$ and $x = x^* + \delta$.

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[1] If you do not remember what I am talking about, see (5.10) in the book.