

# COMP 550, Spring 2015

## Quiz 5 (open book)

Apr 6, 2015

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1) (80') Name: \_\_\_\_\_ PID: \_\_\_\_\_

2) The Coin Change Problem.

A country has coins with denominations  $1 = d_1 < d_2 < \dots < d_k$ . We want to make change for  $n$  cents, using the *smallest number of coins*.

Example A: US Coins --  $d_1 = 1, d_2 = 5, d_3 = 10, d_4 = 25$ . Change for 37 cents – 1 quarter, 1 dime, 2 pennies.

Example B: XX Coins --  $d_1 = 1, d_2 = 4, d_3 = 5, d_4 = 10$ . Change for 7 cents – 5,1,1; Change for 8 cents – 4,4. (The answer is counterintuitive.)

(a) (10') Let  $C[p]$  be the minimum number of coins needed to make change for  $p$  cents. Form an expression for  $C[p]$  (in relationship to  $C[q]$ 's, where  $q < p$ )

(b) (10') Briefly describe an algorithm for solving the problem using Dynamic Programming, and give its (asymptotic) time complexity.

3) (Bonus 5') What your main concern (about the course) at the moment?