Q3 $T(n) = T(n-a) + cn \quad a \geq 1, \; c > 0$

n

$n-a \rightarrow cn$ $\qquad T(n) = n + (n-a) + (n-2a) + \dots + 1$

$T(n-a)$ $n-2a$

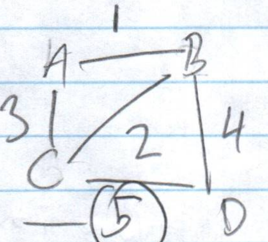
$n-2a \rightarrow c(n-2)$ $\qquad$ amt of work done $= cn$

$a \geq 1$

$O(n*(n-1))$

$O(n^2)$

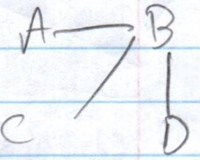
4



MST $\quad T_1$ is a MST of the graph

$w(T)$

$T_2 \qquad T_1$



Prove by contradiction

Assume T_1 is not a MST of the graph induced by T_1

$\exists \, T_1'$ That is a MST of the graph induced by T_1

original was not min

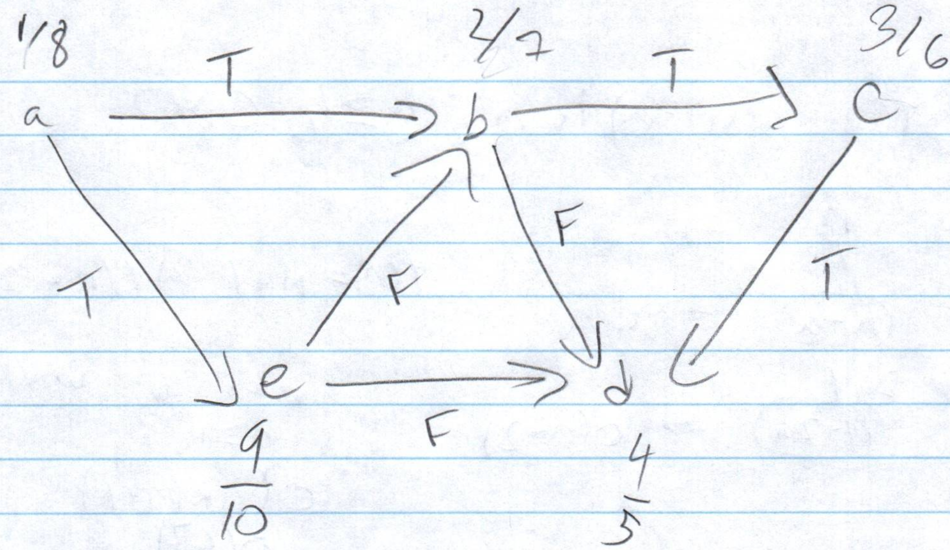
There is a cycle incl max edge

Then $w(T_1') < w(T_1)$

$T_1' \cup T_2 \cup \{(u,w)\}$ is a spanning tree of G

T_1 is a MST of the graph induced by T_1

Q5



Q6 initialization

for i=1 + |V|-1:
  for each u,v ∈ E:
    relax(u,v,w)
for each (u,v) ∈ E: ——— There is no neg cycle
  if d[v] < d[u] + w(u,v):
    return false ← no negative cycle terminate
return True

Q7 C[i] tot cost of words 1-i inclusive

$M = 15$ char

$n = 4$

total cost $(15-14)^3 + (15-13)^3 + \dots (15-4)^3$

Compute C[0] = 0

Compute C[1] = 64

Compute C[2] = 4

Compute C[3] = 68

Compute C[4] = 68

15-7

$l = 7, 5, 7, 9$

6) holiday
merry december
christmas

Q8 OPT = $[o_1, o_2, o_3, \dots, o_k]$ input $A[1 \dots n]$

Let OPT = $\{o_1, o_2, \dots o_k\}$ be an optimal sol

$A[o_i + 1]$

Let $B' = OPT - \{o_1\} + \{b_1\} = \{b_1, o_2, o_3, \dots o_k\}$ B $o_1, o_2 \dots$

$|B'| = |OPT| - 1 + 1 = |OPT|$ is max size

$b_1 \geq o_1$

$OPT[o_1] \geq [o_2]$

B' is compatible

B' is an optimal sol