18.085
Quiz *

Question 1

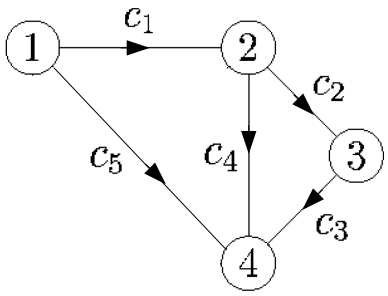
(**15 points**)

a Is $A^T A$ always positive definite for every matrix A?

b If there is a test, on A, what is it?

Question 2

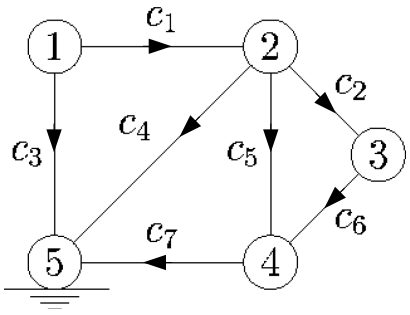
(**5 points**)
What is the INCIDENCE matrix A for this graph?



*PRACTICE QUIZ. NOT for assessment.

Question 3

(**30 points**)
A network of nodes and edges is drawn. Edge number j has conductance $c_j > 0$. Node 5 is grounded (potential $u_5 = 0$). As usual, A is the incidence matrix and C is the diagonal matrix of conductances $(C_{j,j} = c_j)$.



a List all positions (i, j) of the 4 by 4 matrix $K = A^T C A$ that have zero entries.

b What is row 1 of K?

c Find as many independent solutions as possible to Kirchhoff's Law $A^T y = 0$.

d What is 'the trick' that proves $u^T K u \geq 0$ for every vector u?