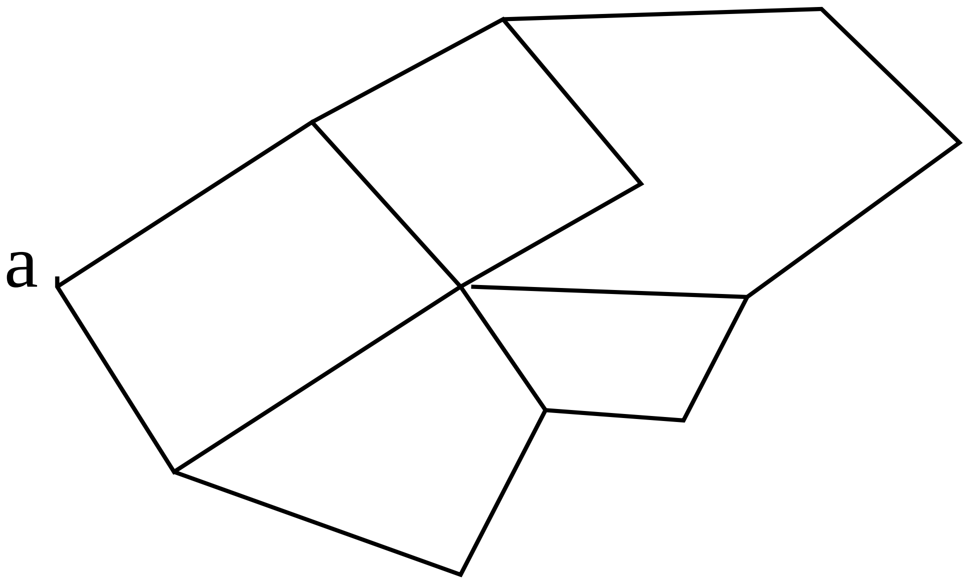
Department of Mathematics
Carnegie Mellon University

21-228 Discrete Mathematics: Section 1
Test 3

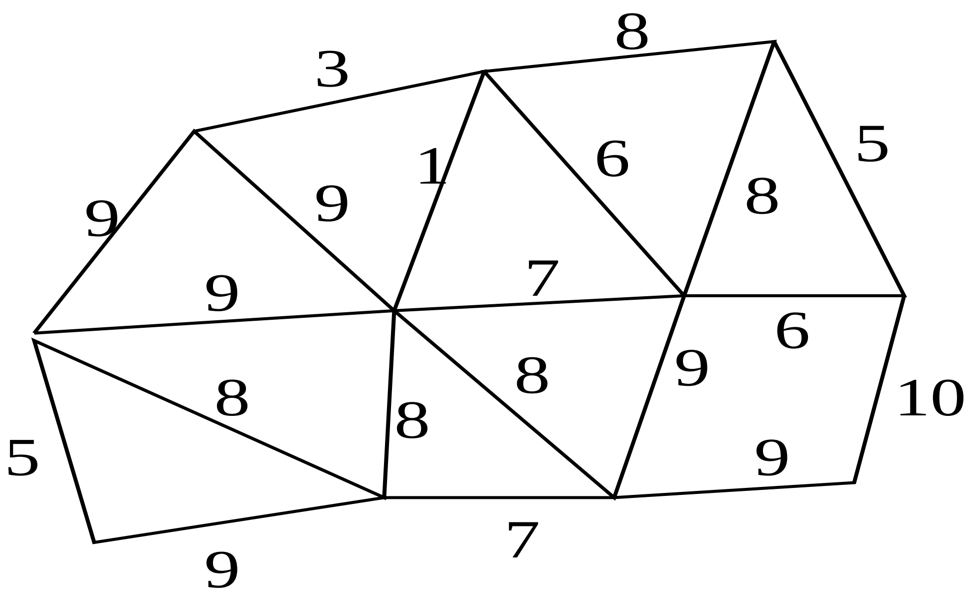
Name:____________________________________

Problem	Points	Score
1	33	
2	33	
3	34	
Total	100	

Q1: (33pts)
(a) Find a proper 2 colouring of the vertices of the following graph by using Breadth-First-Search from vertex a:



(b) Find a maximum weight spanning tree of the following graph:



Q2: (33pts)
Let tree T have n_i vertices of degree i for $i = 1, 2, 3$ and no vertices of degree 4 or more. Show that

$$n_1 = n_3 + 2.$$

[Hint: use induction or find two equations satisfied by n_1, n_2, n_3.]

Q3: (34pts)
Let e be an edge of a connected graph G. Show that e is in **every** spanning tree of G if and only if e is a cut-edge of G.