CSE 5319/6319 Homework 4

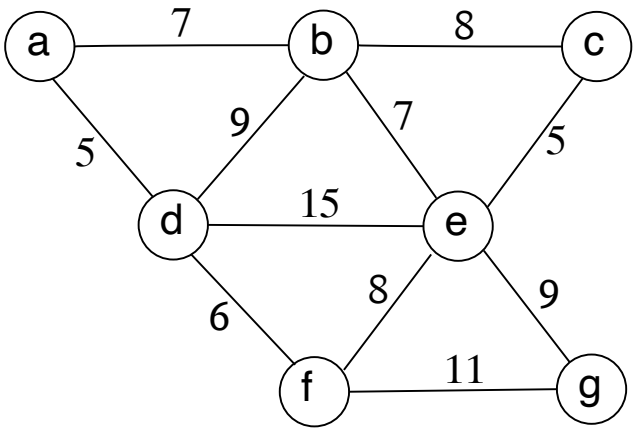
Due April 30, 5:00 p.m. on Canvas

1. KP p. 266, problem 14.18. (10 points)

2. Similar to p. 4-5 of `notes03.2.mech.pdf`, analyze the Allocation Algorithm for Downward Sloping Valuations for following $v_i(k)$ values for buyer i. Note that $v_i(k) = v_{i1} + v_{i2} + \ldots + v_{ik}$. The result is a table of clearing prices and allocations like the one at the top of p. 5. (10 points)

		k								
	$v_i(k)$	0	1	2	3	4	5	6	7	8
	1	0	50	100	140	180	210	230	240	250
			50	50	40	40	30	20	10	10
i	2	0	70	130	181	216	249	279	304	314
			70	60	51	35	33	30	25	10
	3	0	60	110	150	190	225	251	276	301
			60	50	40	40	35	26	25	25

3. Compute the VCG payments for the minimum spanning tree for this graph. (10 points)



4. Determine the optimal fixed price for the following bids for copies of a digital good: (10 points)

```
10  9  8  6  6  5  5  5  5  5  5 4  4  2  2  2  2  1  1  1
```

5. For `https://ranger.uta.edu/~weems/NOTES6319/AUCTION/auction2.dat`: (20 points)

   a. Find a maximum-weight bipartite matching via ascending auction.

b. Compute the lowest envy-free price vector (KP Theorem 17.2.6).

c. Compute the highest envy-free price vector (Corollary 17.2.9).

d. Solve fair division (KP section 17.3) using the above envy-free price vectors for a 5-room apartment with monthly rent of $500.

6. Determine a minimum-weight bipartite matching for `https://ranger.uta.edu/~weems/NOTES6319/AUCTION/auction2.dat`. (10 points)

7. How many maximum-weight bipartite matchings are there for `https://ranger.uta.edu/~weems/NOTES6319/AUCTION/auction4.dat`? (10 points)

8. How many maximum-weight bipartite matchings are there for `https://ranger.uta.edu/~weems/NOTES6319/AUCTION/auction5.dat`? (10 points)

9. Use Gambit to compute Nash equilibria for: (10 points)

$$A = \begin{bmatrix} 3 & 3 \\ 2 & 5 \\ 0 & 6 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 2 \\ 2 & 6 \\ 3 & 1 \end{bmatrix}$$