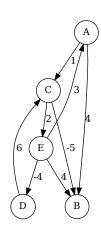
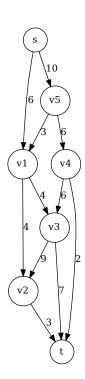
$\begin{array}{c} {\rm CS5200~Homework~4~Graphs} \\ {\rm Adam~McNeil} \\ {\rm Question~1} \end{array}$ 

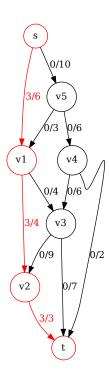


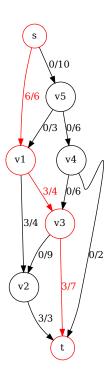
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D(0) = -	Α	0	0 4		1		$\infty$	$\propto$	)	-		1	nil	A	A		nil	nil	
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D(2)	_	С	0	0	-5	0		$\infty$	2			С	nil	C	;	nil	ni	1	С
		D	0	0	$\infty$	6		0	$\infty$			D	nil	ni	1	D	ni	1	nil
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	_	A	(	)	-4	1	С	$\infty$	3	3		A	nil	С		A	ni	l	$\overline{C}$
D(3)		В	0	$\infty$	0	$\infty$	С	$\infty$	$\infty$	- (2) -		В С	nil	ni	l	nil	ni	l	nil
D(9)		С	C	$\infty$	-5	0	C	$\infty$	2	$\pi(3) =$		С	nil	С		nil	ni	l	С
	_	D		$\infty$	1	6		0	8	_		D	nil	С		D	ni	l	С
	_	Е		3	-1	4	-	4	0	-		E	Е	С		A	E		nil

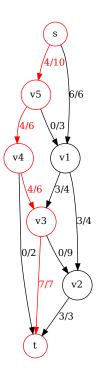
		A	В	$\mid C \mid$	D	$\mid E \mid$			A	В	С	D	E
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	В	$\infty$	0	$\infty$	$\infty$	$\infty$		В	nil	nil	nil	nil	nil
	С	$\infty$	-5	0	$\infty$	2		С	nil	С	nil	nil	С
	D	$\infty$	1	6	0	8		D	nil	С	D	nil	С
	Е	3	-3	2	-4	0		Е	Е	D	D	Е	nil
		A	В	С	D	E			A	В	$\mathbf{C}$	D	E
	A	A 0	B -4	C 1	D -1	E 3		A	A nil	В	C A	D E	E
D(5) —	В						 	В					
$D(5) = \frac{1}{2}$		0	-4	1	-1	3	$\pi(5) = \frac{1}{2}$		nil	С	A	Е	С
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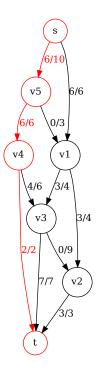


Question 2









## Question 3

Strategy A: 5 different paths are needed until the final answer is reached

$$s->v1->v2->t$$

$$s->v6->v3->t$$

$$s->v5->v4->t$$

$$s->v1->v3->t$$

$$s->v5->v4->v3->t$$

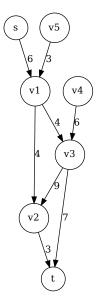
Strategy B: 4 different paths are need until the final answer is reached

$$s->v5->v4->v3->t$$

$$s - > v1 - > v2 - > t$$

$$s->v5->v6->v3->v4->t$$

$$s - > v6 - > v3 - > t$$



## Question 4

1) For a given cut (S, T), the net flow from S to T can be greater than capacity of S and T.

## False

- 2) For any (S, T) cut, if the net flow equals to the capacity of S and T, then we cannot find any augmenting path in the residual graph.
- True
- 3) The Floyd-Warshall algorithm belongs to the greedy algorithm, as it is more efficient than the dynamic programming solution.

## False

4) The Dijksta's algorithm can be used to find the all-pairs shortest paths in a weighted directed graph, and it is more efficient than some dynamic programming solution.

True

Bonus: