first name		last name	id	#	
30 min	30 marks	closed book	no devices	2 pages	page 1
1. [8 marks] represente [-1 2 4]	Let t be the transfer ed below, give the co- instead of like this	formation we saw in the formation $(\neg x_1 \lor x_2 \lor x_4).$	lectures from cnf-sat to all $t(f)$. In this question	3-sat. For the cnf-s n, write boolean cla	sat formula f uses like this
clauses	of f	corresponding c	lauses of t(f)		
[-1 3 5	6]				
[2 3 -4	-5 -6]				
[1 -2 3	-4 5 6]				
	ROUC	H WORK BELOW THIS LI	NE		

2. [7 marks] Does there exist a polytime answer-preserving transformation from k-clique to cnf-satisfiability (cnf-sat)? Write your answer here (yes/no/not known):

Justify your answer here:

first name		last name	ic	$\mathrm{id}\#$	
30 min	30 marks	closed book	no devices	2 pages	page 2

- 3. [3+4+4+4 marks] Recall from the lectures the polytime answer-preserving transformation t() that maps any 3-sat instance z with k clauses to a k-independent set instance t(z) where t(z) is a graph.
 - a) On the nodes below, draw t(z). Label each node with its corresponding literal. $z = (\neg x_1 \lor x_2 \lor x_3) \land (x_1 \lor \neg x_2 \lor x_3) \land (\neg x_1 \lor x_2 \lor x_3) \land (\neg x_1 \lor \neg x_2 \lor \neg x_3)$



b) Assume that t(z) has an independent set I of size k. For each statement below, write T (true) or F (false) and justify your answer.

i) I includes exactly one node from the first clause of z.

T/F? _____ Reason?

ii) I can contain a node labelled $\neg x_j$ and a node labelled x_j .

T/F? _____ Reason?

iii) Let A be the truth assignment that sets each literal that is a node of I to true. A satisfies z. T/F? _____ Reason?

first name		last name	i	d#	
30 min	30 marks	closed book	no devices	$2 \mathrm{pages}$	page 1
1. [8 mar represe [-1 2	The test set t be the transform need below, give the correct 4] instead of like this ($\neg x$	nation we saw in the esponding 3-sat form $x_1 \lor x_2 \lor x_4$).	e lectures from cnf-sat to nula $t(f)$. In this question	o 3-sat. For the cnf-s on, write boolean cla	sat formula f uses like this
clause	s of f	corresponding	clauses of t(f)		
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ROUGH	WORK BELOW THIS LINE				

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b) Assume that t(z) has an independent set I of size k. For each statement below, write T (true) or F (false) and justify your answer.

i) If I contains a node labelled $\neg x_j$, then I does not contain a node labelled x_j .

T/F? _____ Reason?

ii) I includes exactly one node from the first clause of z.

T/F? _____ Reason?

iii) Let A be the truth assignment that sets each literal that is a node of I to true. A satisfies z. T/F? _____ Reason?

first	name		last name		id#	
30 n	nin	30 marks	closed book	no devices	2 pages	page 1
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	clauses of	f	corresponding clause	s of t(f)		
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	[2 3 -4 -5	-6]				
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	ROUGH WORK	BELOW THIS LINE				

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