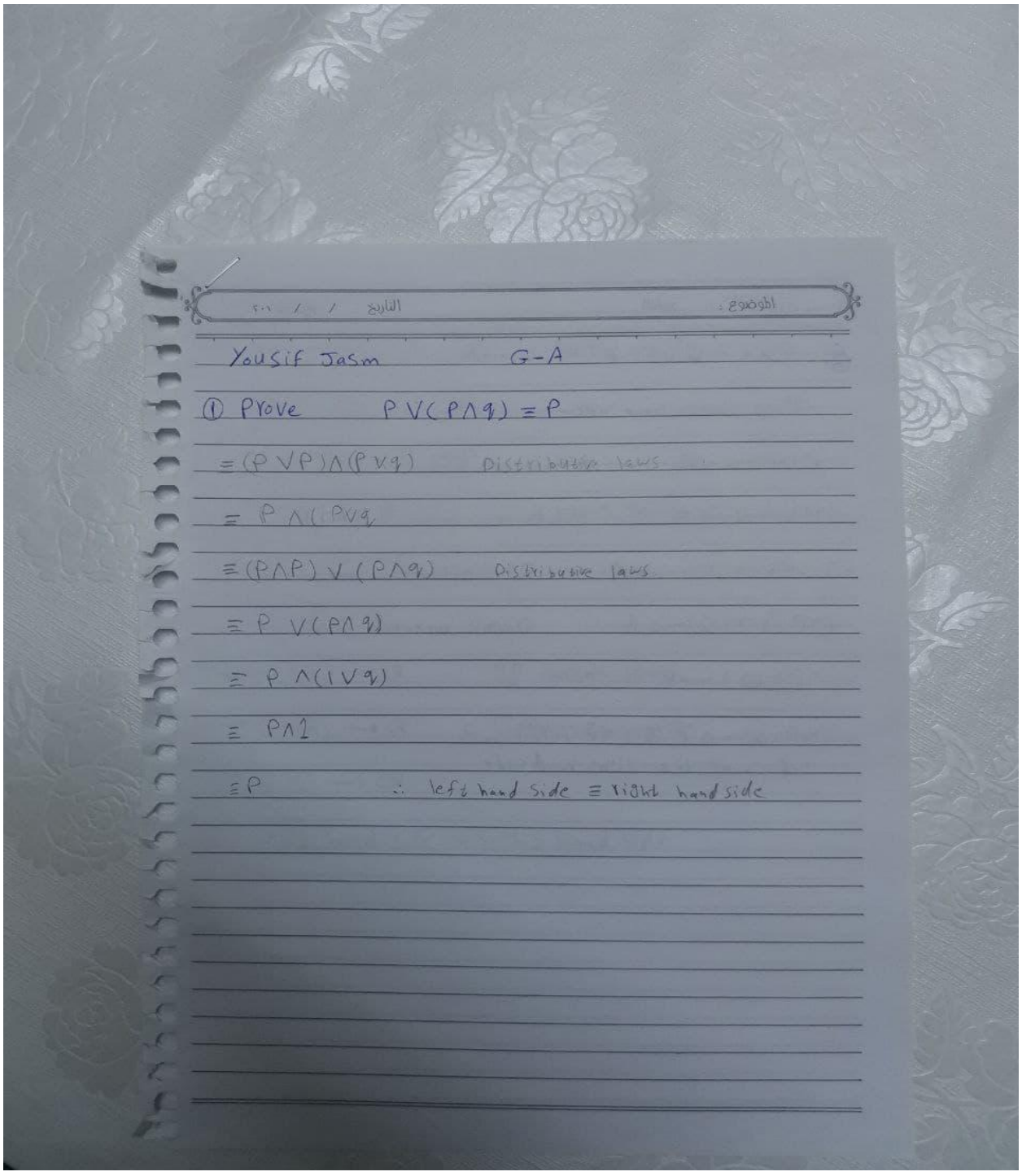
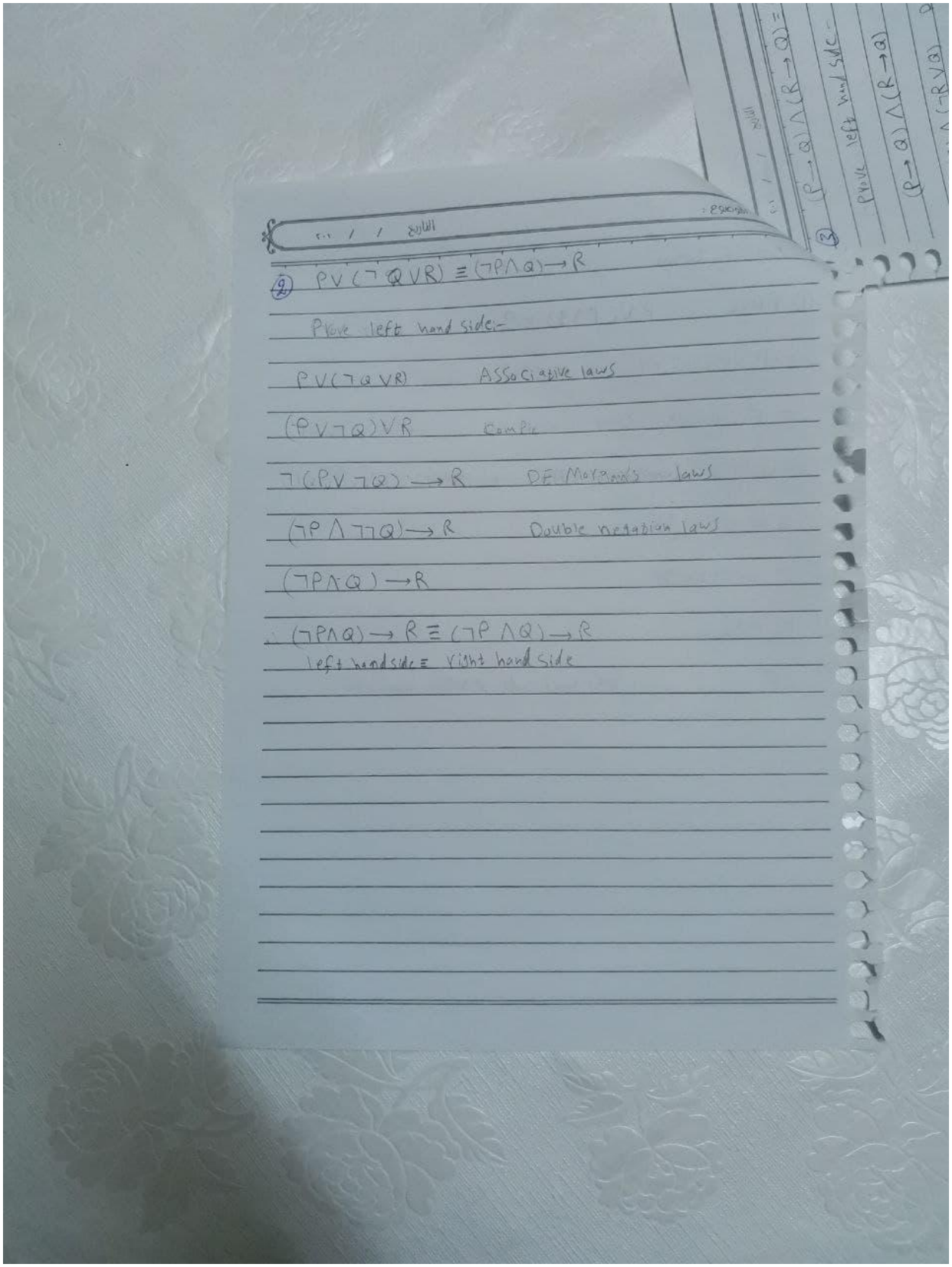
Name : Yousif Jasm Mohammer
Group : A





(2) $P \vee (\neg Q \vee R) \equiv (\neg P \wedge Q) \rightarrow R$

Prove left hand side:-

$P \vee (\neg Q \vee R)$ Associative laws

$(P \vee \neg Q) \vee R$ Comm

$\neg (P \vee \neg Q) \rightarrow R$ DE Morgan's laws

$(\neg P \wedge \neg\neg Q) \rightarrow R$ Double negation laws

$(\neg P \wedge Q) \rightarrow R$

$\therefore (\neg P \wedge Q) \rightarrow R \equiv (\neg P \wedge Q) \rightarrow R$

left hand side ≡ right hand side

(3) $(P \rightarrow Q) \wedge (R \rightarrow Q) \equiv$

Prove left hand side:-

$(P \rightarrow Q) \wedge (R \rightarrow Q)$

$(\neg P \vee Q) \wedge (\neg R \vee Q)$

③ $(P \rightarrow Q) \wedge (R \rightarrow Q) \equiv (P \vee R) \rightarrow Q$

Prove left hand side -

$(P \rightarrow Q) \wedge (R \rightarrow Q)$

$(\neg P \vee Q) \wedge (\neg R \vee Q)$ Distributive laws

$Q \vee (\neg P \wedge \neg R)$

$(\neg P \wedge \neg R) \vee Q$

$\neg(\neg P \wedge \neg R) \rightarrow Q$ DE Morgan laws

$(\neg\neg P \vee \neg\neg R) \rightarrow Q$ Double negation laws

$(P \vee R) \rightarrow Q$

∴ left hand side ≡ right hand side