CS2200 F-24 Homework

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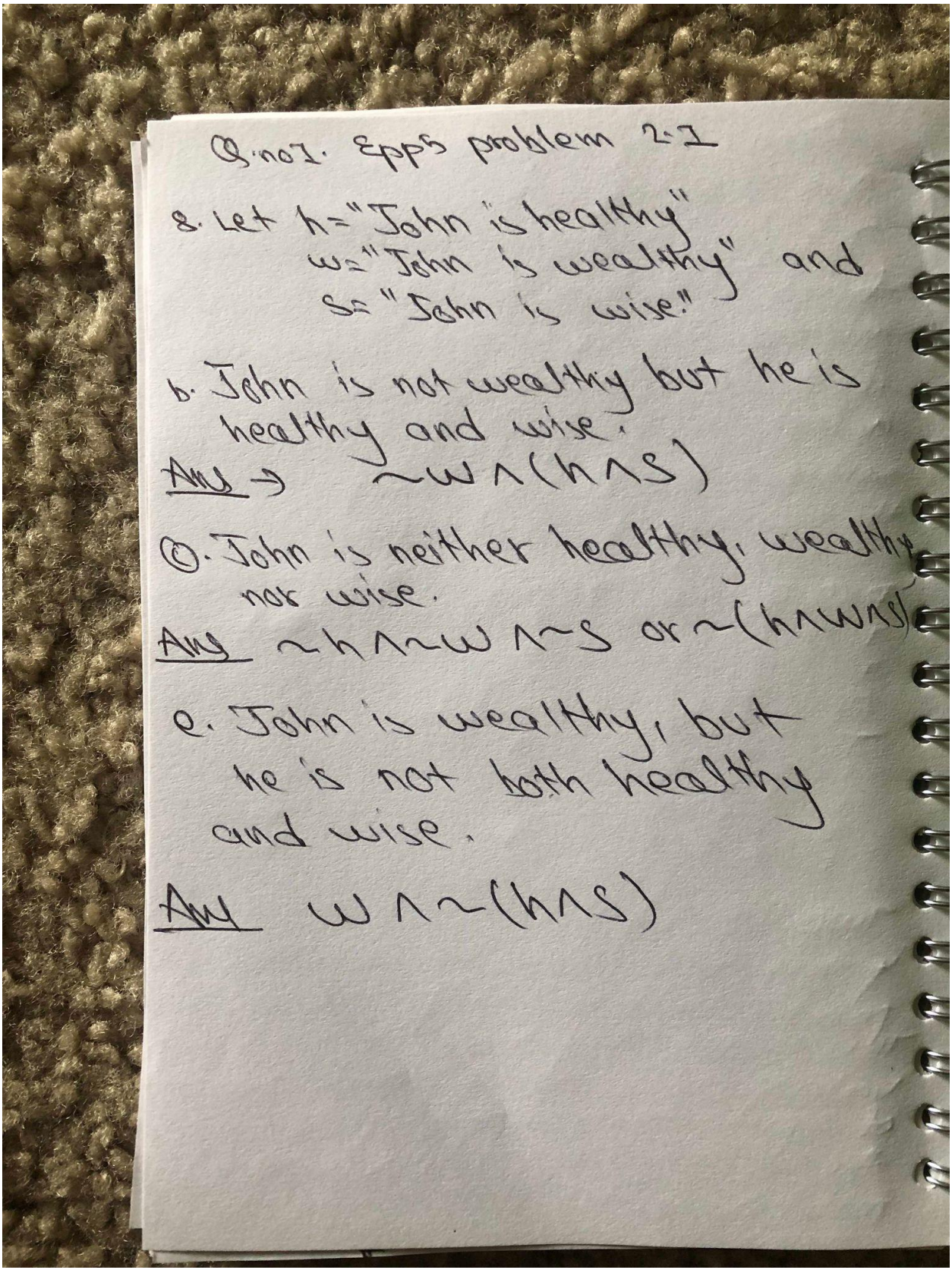
1. Epp5 problem 2.1.8 b, c, e / p51.



Q. no 7. Epps problem 2.1

a. Let h = "John is healthy"
w = "John is wealthy" and
s = "John is wise."

b. John is not wealthy but he is healthy and wise.

Ans → $\sim w \wedge (h \wedge s)$

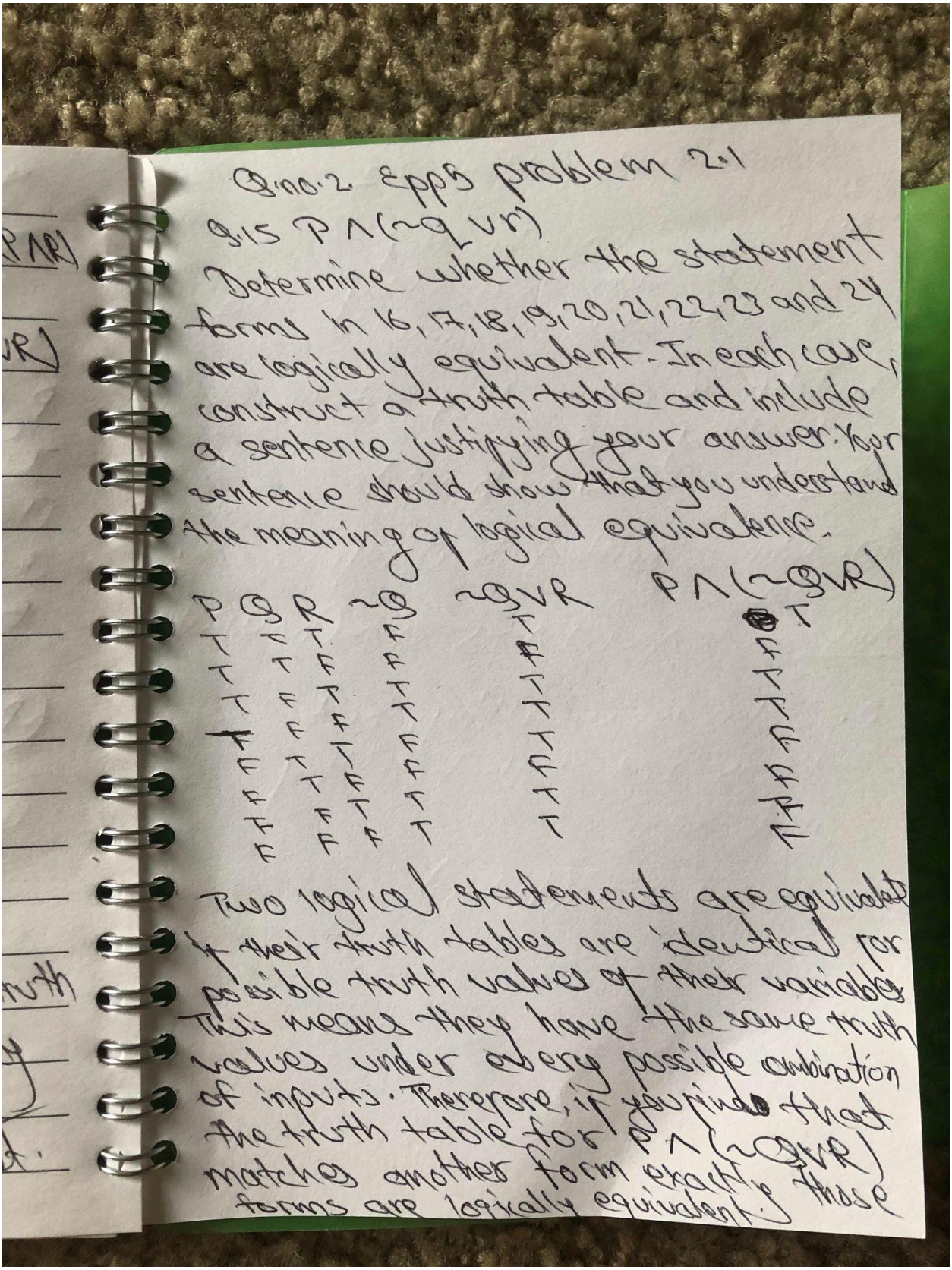
c. John is neither healthy, wealthy nor wise.

Ans $\sim h \wedge \sim w \wedge \sim s$ or $\sim(h \vee w \vee s)$

e. John is wealthy, but he is not both healthy and wise.

Ans $w \wedge \sim(h \wedge s)$

2. **Epp5 problem 2.1.15 / p52.**



Q.no.2. Epp5 problem 2.1

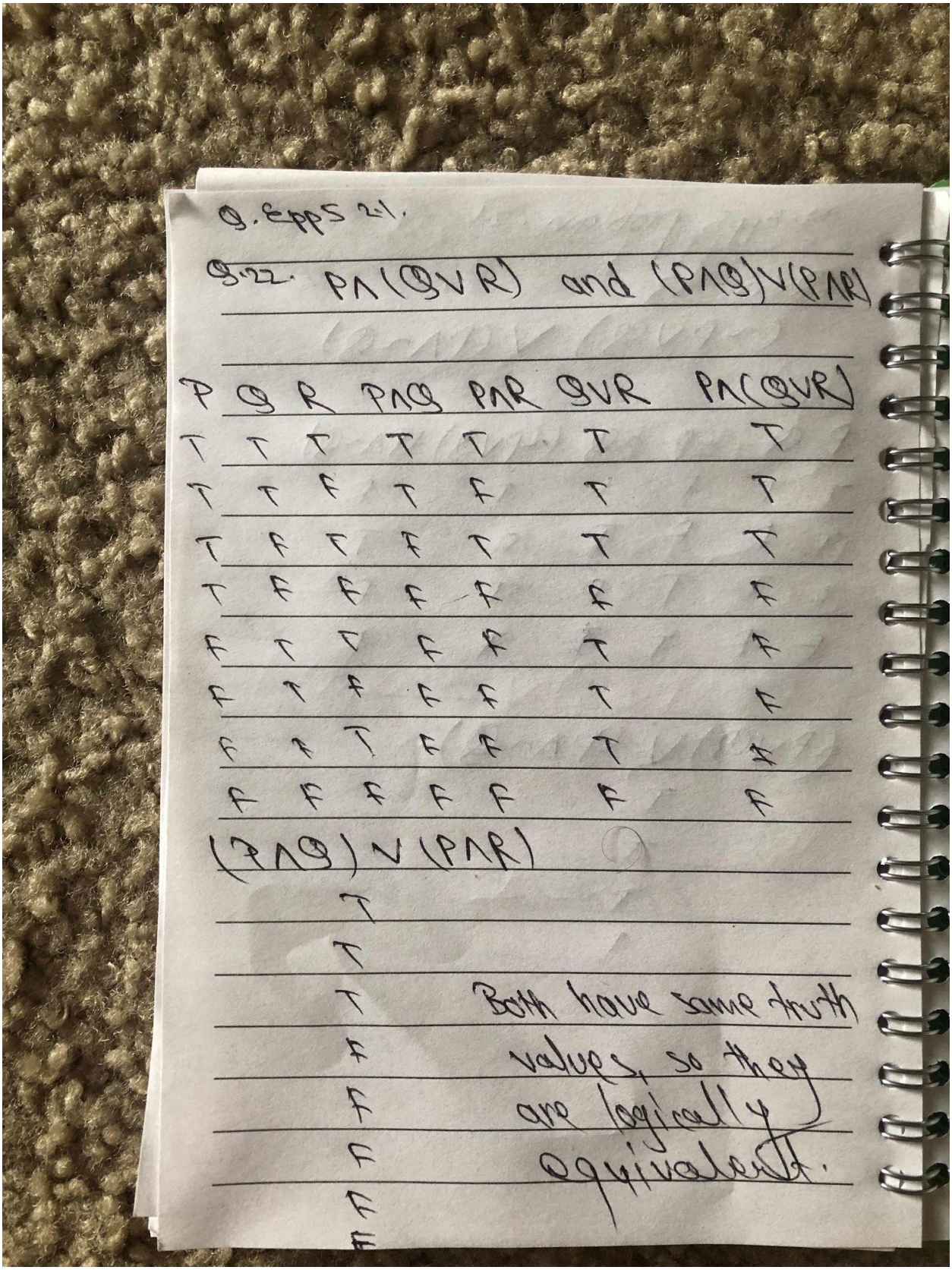
Q.15 $P \wedge (\sim q \vee r)$

Determine whether the statement forms in 16, 17, 18, 19, 20, 21, 22, 23 and 24 are logically equivalent. In each case, construct a truth table and include a sentence justifying your answer. Your sentence should show that you understand the meaning of logical equivalence.

P	Q	R	~Q	~Q ∨ R	P ∧ (~Q ∨ R)
T	T	T	F	T	T
T	T	F	F	F	F
T	F	T	T	T	T
T	F	F	T	T	T
F	T	T	F	T	F
F	T	F	F	F	F
F	F	T	T	T	F
F	F	F	T	T	F

Two logical statements are equivalent if their truth tables are identical for possible truth values of their variables. This means they have the same truth values under every possible combination of inputs. Therefore, if you find that the truth table for $P \wedge (\sim Q \vee R)$ matches another form exactly, those forms are logically equivalent.

3. **Epp5 problem 2.1.22 / p52.**



Q. Epp5 2.1.

Q.22. $P \wedge (Q \vee R)$ and $(P \wedge Q) \vee (P \wedge R)$

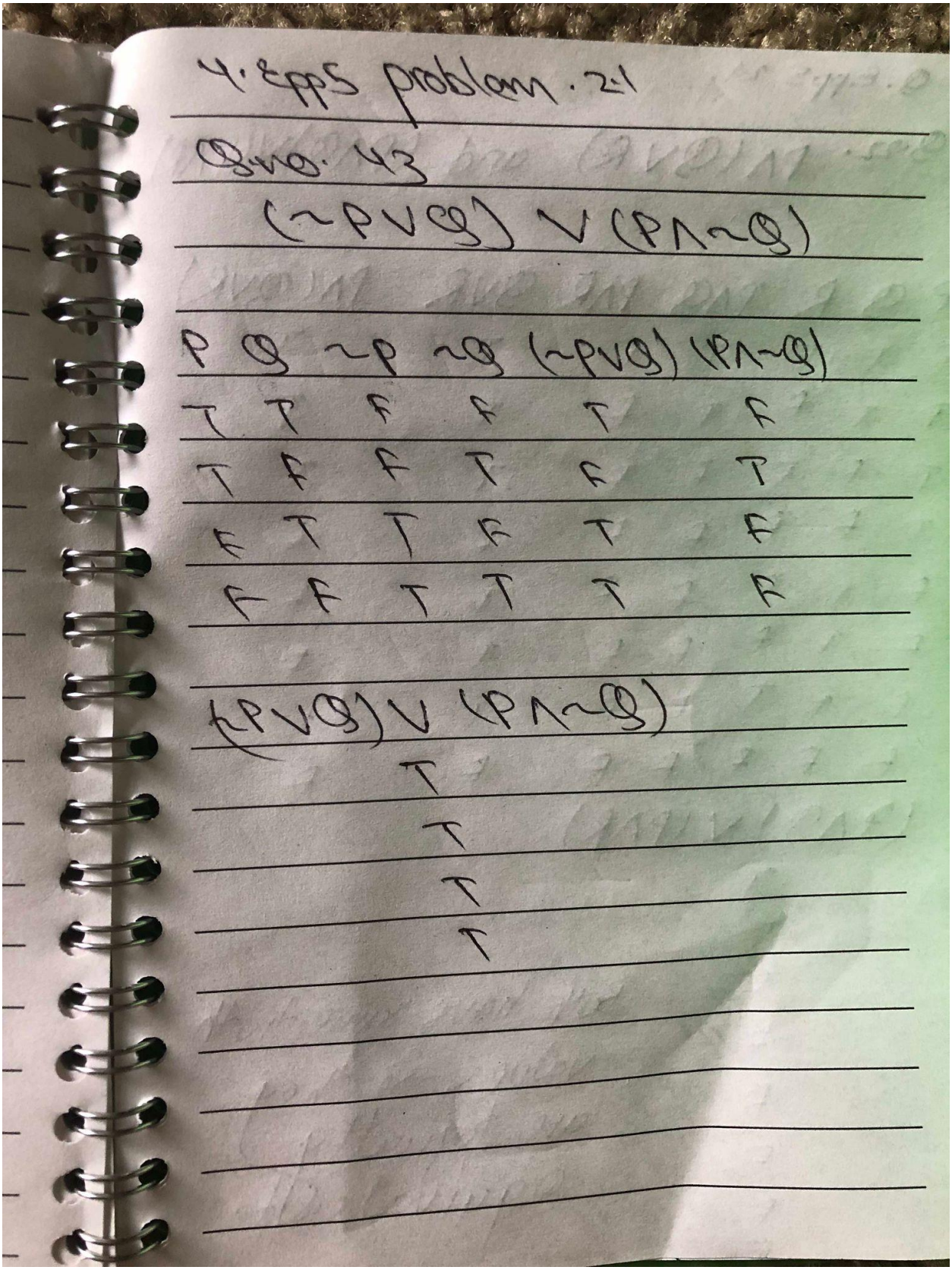
P	Q	R	$P \wedge Q$	$P \wedge R$	$Q \vee R$	$P \wedge (Q \vee R)$
T	T	T	T	T	T	T
T	T	F	T	F	T	T
T	F	T	F	T	T	T
T	F	F	F	F	F	F
F	T	T	F	F	T	F
F	T	F	F	F	T	F
F	F	T	F	F	T	F
F	F	F	F	F	F	F

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

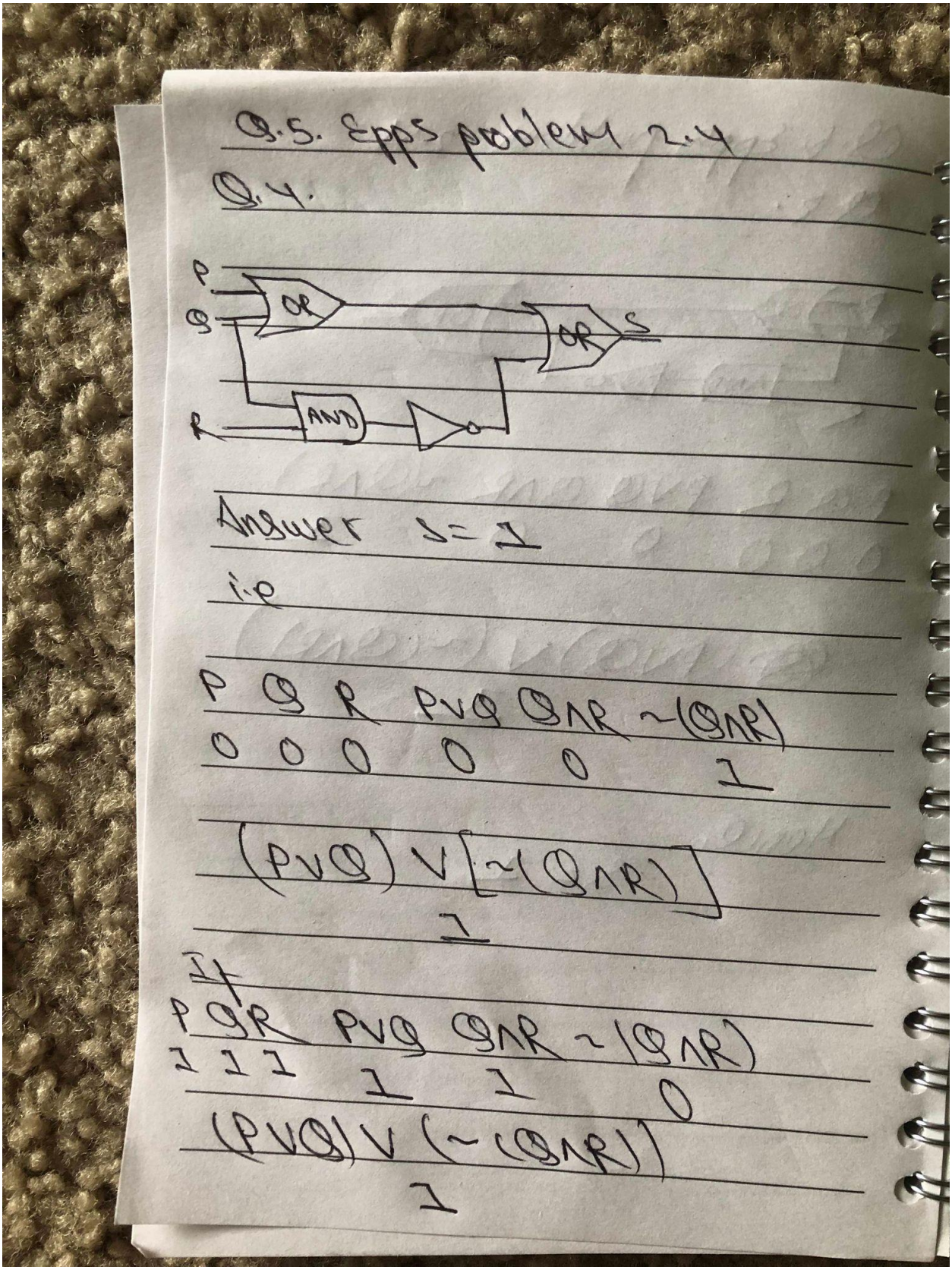
T
T
T
F
F
F
F

Both have same truth values, so they are logically equivalent.

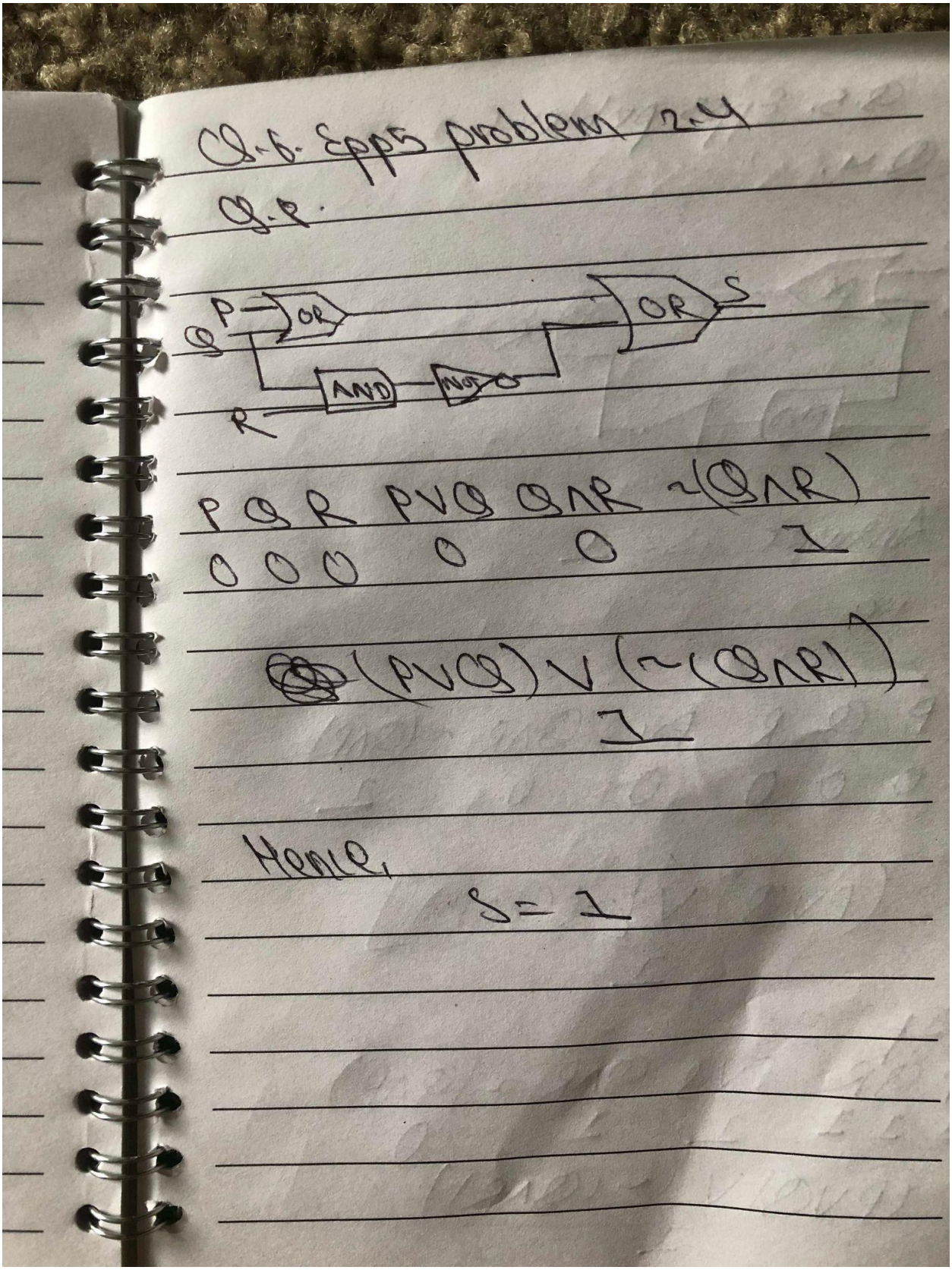
4. Epp5 problem 2.1.43 / p52.



5. Epp5 problem 2.4.4 / p91.



6. Epp5 problem 2.4.8 / p91.



7. Epp5 problem 2.4.12 / p91.