Question 1. [11 MARKS] EXPRESSIONS

Let $R : \mathbb{N} \to \mathbb{B}$, and define predicates $P, Q : \mathbb{N} \to \mathbb{B}$ by the following tables:

$\mathbb{N}$:	0	1	2	3	4	5	$\cdots$	165	$\cdots$	general term
P :	F	F	T	T	T	F	$\cdots$	F	$\cdots$	$1 < n < 5$
Q :	T	F	T	F	T	F	$\cdots$	F	$\cdots$	n is even

Part (a) [2 MARKS]

Fill in each blank below to make each equivalence correct. For the restricted domain on the second line, enumerate *at least* the first four natural numbers in the set, based on the definitions of P, Q above.

$$\exists n \in \mathbb{N},\ (P(n) \vee Q(n)) \wedge R(n)$$

$$\equiv \exists n \in \{\underline{\quad 0, 2, 3, 4, \ldots \quad}\},\ \underline{\quad R(n) \quad}$$

$$\equiv \left(\underline{\quad R(0) \quad}\right) \vee \left(\underline{\quad R(2) \quad}\right) \vee \left(\underline{\quad R(3) \quad}\right) \vee \left(\underline{\quad R(4) \quad}\right) \vee \ldots$$