

Sheet (#1)—373 math

Name:.....

Q1) Let  $X = \mathbb{N}$ , for each  $n \in \mathbb{N}$  define  $U_n = \{n, n + 1, n + 2, \dots\}$ . Let  $\tau = \{\emptyset, X\} \cup \{U_n : n \in \mathbb{N}\}$ . Prove that  $\tau$  is a topology on  $X$ .

Q2) Consider  $(\mathbb{R}, \tau)$ , where  $\tau = \{\mathbb{R}, \emptyset, \{5\}, (-\infty, 5], [5, \infty)\}$ . Find

a)  $\text{Int}(\mathbb{N})$

b)  $\text{cl}(\mathbb{N})$

c)  $\text{Bd}(\mathbb{N})$

Q3) Proof or disproof the following sentences.

a) If  $\tau_1$  and  $\tau_2$  are two topologies on  $X$ , then  $\tau_1 \cup \tau_2$  is a topology on  $X$ . ( ).

b) Let  $(X, \tau)$  be a topological space, let  $A \subseteq X$ . If  $A \cap \text{Bd}(A) = \emptyset$ , then  $A$  is an open set. ( ).