Name: _____ Score (Out of 7 points):

1. (7 points) For each of the following sequences: state the set of all limits, or, if the sequence has no limits, write "`Does not converge`". **No justification necessary.**

   (a) Let $X = \{a, b, c\}$ have the topology $\{\varnothing, \{c\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}$.

   (i) $c,\ b,\ c,\ b,\ c,\ b,\ c,\ b,\ \cdots$

   (ii) $c,\ c,\ c,\ c,\ c,\ c,\ c,\ c,\ c,\ \cdots$

   (iii) $a,\ a,\ a,\ a,\ a,\ a,\ a,\ a,\ a,\ \cdots$

   (b) Let $\mathbb{R}$ have the topology $\{U \mid 0 \notin U\} \cup \{\mathbb{R}\}$.

   (i) $1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9, \cdots$

   (ii) $1,\ 1,\ 1,\ 1,\ 1,\ 1,\ 1,\ 1,\ 1, \cdots$

   (c) Let $\mathbb{R}$ have the cofinite topology.

   (i) $1,\quad 1,\ 2,\quad 1,\ 2,\ 3,\quad 1,\ 2,\ 3,\ 4,\quad 1,\ 2,\ 3,\ 4,\ 5,\ \cdots$

   (ii) $1,\ \frac{1}{2},\ \frac{1}{3},\ \frac{1}{4},\ \frac{1}{5},\ \frac{1}{6},\ \frac{1}{7},\ \frac{1}{8},\ \frac{1}{9}, \cdots$