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) $c,\ b,\ c,\ b,\ c,\ b,\ c,\ b,\ \cdots$ limits: $\{b\}$

   (ii) $c,\ c,\ c,\ c,\ c,\ c,\ c,\ c,\ c,\ \cdots$ limits: $\{a, b, c\}$

   (iii) $a,\ a,\ a,\ a,\ a,\ a,\ a,\ a,\ a,\ \cdots$ limits: $\{a\}$

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

   (i) $1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9, \cdots$ limits: $\{0\}$

   (ii) $1,\ 1,\ 1,\ 1,\ 1,\ 1,\ 1,\ 1,\ 1, \cdots$ limits: $\{0, 1\}$

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

   (i) $1,\ \ 1,\ 2,\ \ 1,\ 2,\ 3,\ \ 1,\ 2,\ 3,\ 4,\ \ 1,\ 2,\ 3,\ 4,\ 5,\ \cdots$ `Does not converge`

   (ii) $1,\ \frac{1}{2},\ \frac{1}{3},\ \frac{1}{4},\ \frac{1}{5},\ \frac{1}{6},\ \frac{1}{7},\ \frac{1}{8},\ \frac{1}{9}, \cdots$ limits: all real numbers