# Which Spaces have UMP?

1. Identify whether the given subspace of $\mathbf{R}$ has the UMP, does not have the UMP, or whether you are unsure. If you give a definite answer, cite a theorem and/or explain; if you are unsure, say why the theorems don't apply. (Avoid looking back at your previous answers!)

   (a) $[0, 1] \cup \{2\}$

   (b) $\bigcup_{n=1}^{8} \{n\}$

   (c) $[0, 1] \cup [2, 3]$

   (d) $[0, 1) \cup (2, 3)$

   (e) $\{1\} \cup \{2\} \cup \{3\}$

   (f) $[0, 1] \cup [2, 3] \cup [4, 5]$

   (g) $[0, 1] \cup \mathbf{Q}$

   (h) $(0, 1) \cup \mathbf{Q}$

   (i) $\bigcup_{n=1}^{4} [n, n + 1/2]$

   (j) $\{0\} \cup \{1\}$

   (k) $\bigcup_{n=1}^{5} [n, n + 1/2]$

(l) $\bigcup_{n=1}^{14}[n, n+1/2]$

(m) $\mathbf{R} - \mathbf{Q}$

(n) The Cantor Set

(o) $\bigcup_{n=1}^{\infty}[n, n+1/2]$

2. Create your own space $X$ with (or without) the UMP. Consider using sets like $\{1/n : n \in \mathbf{N}\}$ as part of $X$.