

Homework 7

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5. If  $|x_n - z| < \varepsilon$  for  $n \geq K_1$  and  $|y_n - z| < \varepsilon$  for  $n \geq K_2$ , let  $K := \sup\{2K_1 - 1, 2K_2\}$ . Then  $|z_n - z| < \varepsilon$  for  $n \geq K$ .
14. Choose  $n_1 \geq 1$  so that  $x_{n_1} \geq s - 1$ , then choose  $n_2 > n_1$  so that  $x_{n_2} > s - 1/2$ , and, in general, choose  $n_k > n_{k-1}$  so that  $x_{n_k} > s - 1/k$ .

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7. If  $x_n, x_m$  are integers and  $|x_m - x_n| < 1$ , then  $x_n = x_m$ .
12. Show that  $|x_{n+1} - x_n| < \frac{1}{4}|x_n - x_{n-1}|$ . The limit is  $\sqrt{2} - 1$ .