This exam has questions 1 through 5 with a total of 50 points.

$\boxed{10}$ 1. Use the QRS definition to show that the sequence $k \in \mathbf{Z}_{\geq 0} \mapsto \frac{k+3}{k+2}$ converges.

10 2. Use the QRS definition of an *open set* to show that the interval $(-\infty, 1)$ is open.

10   3. Use the QRS definition of a *closed set* to show that interval $[-1, 1]$ is closed.

10   4. Show that the set **R** is not compact by showing that there is an open cover of **R** that has no finite subcover.

`10` 5. Use the inequality $|\sqrt{a} - \sqrt{b}| \le \sqrt{|a-b|}$, for $a, b > 0$ to show that the function $F = x \in [-1, \infty) \mapsto \sqrt{1+x}$, is continuous at 1.