Homework 5
3.1
Page 59

5. (a) We have $0 < n/(n^2+1) < n/n^2 = 1/n$. Given $\varepsilon > 0$, let $K(\varepsilon) \geq 1/\varepsilon$.
(b) We have $|2n/(n+1) - 2| = 2/(n+1) < 2/n$. Given $\varepsilon > 0$, let $K(\varepsilon) \geq 2/\varepsilon$.
(c) We have $|(3n+1)/(2n+5) - 3/2| = 13/(4n+10) < 13/4n$. Given $\varepsilon > 0$, let $K(\varepsilon) \geq 13/4\varepsilon$.

7. (a) $[1/\ln(n+1) < \varepsilon] \iff [\ln(n+1) > 1/\varepsilon] \iff [n+1 > e^{1/\varepsilon}]$. Given $\varepsilon > 0$, let $K \geq e^{1/\varepsilon} - 1$.
(b) If $\varepsilon = 1/2$, then $e^2 - 1 \approx 6.389$, so we choose $K = 7$. If $\varepsilon = 1/10$, then $e^{10} - 1 \approx 22,025.466$, so we choose $K = 22,026$.

10. Let $\varepsilon := x/2$. If $M := K(\varepsilon)$, then $n \geq M$ implies that $|x - x_n| < \varepsilon = x/2$, which implies that $x_n > x - x/2 = x/2 > 0$.