

HOMEWORK 14

Problems 1 through 4 are due Friday Nov. 30.

- 1) Fitzpatrick Section 2.3 number 9.
- 2) Fitzpatrick Section 2.4 number 3.
- 3) Fitzpatrick Section 2.4 number 9.
- 4) Let $0 < r < 1$.
 - a) Prove $\{r^n\}$ converges using the Monotone Convergence Theorem.
 - b) What does $\{r^n\}$ converge to? Prove your answer is correct using the definition of convergence.

Problems 5 through 8 are due Monday Dec. 3.

- 5) Suppose the sequence $\{a_n\}$ converges to a . Prove that this limit is unique.
- 6) Prove the product property for sequences. You may not follow the proof from Fitzpatrick. You should use the technique of adding/subtracting the same thing. So $a - b = a - c + c - b$. You will also need the triangle inequality and 'facts' about convergent sequences.
- 7) Let $\{a_n\}$ converge to a . Prove all subsequences of $\{a_n\}$ also converge to a .
- 8) Let $\{a_n\}$ be a sequence. Let $\{b_{n_k}\}$ and $\{c_{n_k}\}$ be subsequences of $\{a_n\}$. Prove that if $\{b_{n_k}\}$ converges to b and $\{c_{n_k}\}$ converges to c with $b \neq c$, then $\{a_n\}$ does not have a limit.