

## HOMEWORK 15

- 1) Fitzpatrick Section 2.3 number 1.
- 2) Assume  $\{a_n\}$  is monotonically increasing and define  $s_n = a_1 + a_2 + \cdots + a_n$  for all  $n \in \mathbb{N}$ . Prove the sequence  $\{\frac{s_n}{n}\}$  is also increasing. [Note this can also be done for a decreasing sequence.]
- 3) Use the Monotone Convergence Theorem to prove each of the following sequences converge.
  - a)  $y_n = \frac{3n-1}{n-2}$  for all  $n \in \mathbb{N}$ .
  - b)  $x_n = \frac{1}{2n+1} + \frac{1}{2n+2} + \cdots + \frac{1}{3n}$  for all  $n \in \mathbb{N}$  (Hint writing  $3n$  as  $2n + n$  might help.)
  - c)  $\{a_n\}$  by  $a_n = \frac{\sqrt{n}}{n+2}$  for all  $n \in \mathbb{N}$
- 4) Fitzpatrick section 2.3 number 3.
- 5) Fitzpatrick section 2.3 number 8.