Name: ....

Student ID: ....

PROBLEMS

Q1) Let the sequence be defined by

$$a_1 = \frac{1}{2}, \ a_2 = \frac{1}{2 + \frac{1}{2}}, \ a_3 = \frac{1}{2 + \frac{1}{2 + \frac{1}{2}}}, \ \dots.$$

(a) (1 point) Find a function f of a_n that gives a_{n+1}:

$$a_{n+1} = f(a_n).$$

(b) (3 points) Prove that the sequence $\{a_n\}$ converges by Monotonic Sequence Theorem.

(c) (2 points) Find the limit of the sequence $\{a_n\}$.

Q2) (4 points) For any $b > 0$, consider the series $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^b}$. For which values of b this series converges. Give reason for your answer.