

MATH157Y

ASSIGNMENT 1

Chapter 1: Question 7

Prove that if $0 < a < b$, then

$$a < \sqrt{ab} < \frac{a+b}{2} < b$$

Notice that the inequality $\sqrt{ab} \leq (a+b)/2$ holds for all $a, b \geq 0$. A generalization of this fact occurs in Problem 2-22.

Chapter 2: Question 5

(a) Prove by induction on n that

$$1 + r + r^2 + \dots + r^n = \frac{1 - r^{n+1}}{1 - r}$$

if $r \neq 1$ (if $r = 1$, evaluating the sum certainly presents no problem).

(b) Derive this result by setting $S = 1 + r + \dots + r^n$, multiplying this equation by r , and solving the two equations for S .