

Assignment 3

Due Monday 25 October 15:00 (in supervisor pigeon hole)

1. Prove that each of the following sequences tends to infinity
 - (a) $a_n = n + 10$
 - (b) $a_n = \sqrt{n} + \sin n$
 - (c) $a_n = 2\sqrt{n}$
2. Prove that none of the following sequences tends to infinity
 - (a) $a_n = 40 - \frac{1}{n}$
 - (b) $b_n = \cos(n^2 + 7)$
 - (c) $c_n = 2^{\sin(n\pi)}$
3. Prove that a sequence which is bounded above cannot tend to infinity.
4. A sequence is known to be increasing.
 - (a) Might it have an upper bound?
 - (b) Might it have a lower bound?
 - (c) Must it have an upper bound?
 - (d) Must it have a lower bound?
5. Prove
 - (i) Sum Rule
 - (ii) Product Rule
 - (iii) Quotient Rulefor sequences.
6. Find the limit of the sequences defined below
 - (a) $\frac{7n^2+8}{4n^2-3n}$
 - (b) $\frac{2^n+1}{2^n-1}$
 - (c) $\frac{(\sqrt{n}+3)(\sqrt{n}-2)}{4\sqrt{n}-5n}$
 - (d) $\frac{1+2+\dots+n}{n^2}$