Calculus II, MAT102,

Sheet 4 (Sequences of Real Numbers & Infinite Series)

Name	
Student Number	
Year	
Mark	/10
Hand in by	

(Exercises)

Please attach your working, with this sheet at the front.

1. write out the first six terms of the given sequence.
   (i) $a_n = \dfrac{3}{n+4}$ (ii) $a_n = (-1)^n \dfrac{n}{n+1}$

2. Determine whether the sequence converges or diverges.
   (i) $a_n = \dfrac{5n^3 - 1}{2n^3 + 1}$
   (ii) $a_n = (-1)^n \dfrac{n+4}{n+1}$

3. Use the Squeeze Theorem to prove that the given sequence converges to 0
$$a_n = \frac{\cos n\pi}{n^2} \ .$$

4. Determine whether the sequence is increasing, decreasing or neither.
$$a_n = \frac{3^n}{(n+2)!} \ .$$

5. Determine whether the series converges or diverges. For convergent series, find the sum of the series.
   (i) $\displaystyle\sum_{k=0}^{\infty} \left(\frac{1}{3}\right) 5^k$
   (ii) $\displaystyle\sum_{k=3}^{\infty} (-1)^k \frac{3}{2^k}$

(iii) $\displaystyle\sum_{k=1}^{\infty} \frac{4}{k(k+2)}$

(iv) $\displaystyle\sum_{k=1}^{\infty} \frac{4k}{k+2}$

(v) $\displaystyle\sum_{k=1}^{\infty} \frac{9}{k(k+3)}$

(vi) $\displaystyle\sum_{k=0}^{\infty} \left(\frac{1}{2^k} - \frac{1}{k+1}\right)$

(vii) $\displaystyle\sum_{k=2}^{\infty} \left(\frac{1}{k} - \frac{1}{4^k}\right)$

(viii) $\displaystyle\sum_{k=0}^{\infty} \left(\frac{1}{2^k} - \frac{1}{3^k}\right)$