

EXAM DURATION 1H

Midterm 2

29/11/2015

Question 1. [2+2 marks]

Determine whether the series converges or diverges (if it converges find the sum)

1. $\sum_{k=0}^{\infty} \left[\frac{3}{2^k} - 2 \left(\frac{1}{4} \right)^k \right]$.
2. $\sum_{k=0}^{\infty} \left[7 \left(\frac{5}{6} \right)^k + \frac{2^k}{11} \right]$.

Question 2. [2+3+2 marks]

Investigate the convergence or divergence of the following series

1. $\sum_{k=0}^{\infty} \frac{k^3 + 3k^2 - 1}{4k^3 + 2}$.
2. $\sum_{k=0}^{\infty} \frac{2}{(k+1)(k+2)}$, (Hint: $\frac{1}{(k+1)(k+2)} = \frac{1}{k+1} - \frac{1}{k+2}$).
3. $\sum_{k=1}^{\infty} \frac{5k+1}{k^5 + 2k^3 + k^2}$.

Question 3. [3+2+4 marks]

1. Use the Ratio test to study the absolute convergence for the series $\sum_{k=0}^{\infty} \frac{(-1)^k 2^k}{5^k (3k+1)}$.
2. Determine whether the series $\sum_{k=1}^{\infty} \left(\frac{5k^2 + k - 1}{3k^2 - 2} \right)^k$ converges or diverges.
3. Determine the interval of convergence for the series $\sum_{k=1}^{\infty} \frac{(x-3)^k}{3^k k}$.