

Quiz 12 would cover (if we had time for it) the following material: (all handouts posted on the web site so far)

- All material for Quizzes 1-11 and Exams 1, 2
- Sequences, Limits of Sequences and proofs from Sequences - part 2
- Definition of series, convergence of series.
- Computing the sum of geometric series and telescoping series.
- Determining convergence or divergence using the  $n$ th term test, or that the sequence of partial sums is bounded or not
- Determining conditional or absolute convergence using the integral test, the comparison test, the ratio and root test, and the Leibniz test (same as alternating series test)
- Computing sums of series and a constant multiple of a series.

## Sample Quiz 12

1. Prove that convergent sequences are bounded.
2. Prove that the limit of a sequence is unique.
3. Determine whether the series converges absolutely, converges conditionally, or diverges.

$$\text{a) } \sum_{n=1}^{\infty} (-1)^n \frac{1}{(n-1)^3}$$

$$\text{g) } \sum_{n=1}^{\infty} \frac{(-12)^n}{n^2}$$

$$\text{m) } \sum_{n=1}^{\infty} \frac{n!}{2 \cdot 4 \cdot 6 \cdot \dots \cdot (2n)}$$

$$\text{s) } \sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n}}{(2n)!}$$

$$\text{b) } \sum_{n=0}^{\infty} \left(1 - \frac{1}{n}\right)^n$$

$$\text{h) } \sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n}$$

$$\text{n) } \sum_{n=0}^{\infty} \frac{n!}{2^n}$$

$$\text{t) } \sum_{n=1}^{\infty} \frac{\sin(2n)}{1+2^n}$$

$$\text{c) } \sum_{n=1}^{\infty} \frac{(-10)^n}{4^{2n-1}(n+1)}$$

$$\text{i) } \sum_{n=0}^{\infty} (\tan^{-1} n)^n$$

$$\text{o) } \sum_{n=0}^{\infty} \frac{(-5)^n}{(n+2)2^{3n-1}}$$

$$\text{u) } \sum_{n=2}^{\infty} \frac{(-1)^n \sqrt{n}}{n+1}$$

$$\text{d) } \sum_{n=1}^{\infty} \frac{n^2}{(2n-1)!}$$

$$\text{j) } \sum_{n=1}^{\infty} \frac{\cos\left(\frac{n\pi}{3}\right)}{n!}$$

$$\text{p) } \sum_{n=0}^{\infty} \frac{(-1)^n}{2+5^n}$$

$$\text{v) } \sum_{n=2}^{\infty} \frac{1}{n+n\cos^2 n}$$

$$\text{e) } \sum_{n=1}^{\infty} \frac{(-3)^n}{n^n}$$

$$\text{k) } \sum_{n=1}^{\infty} \frac{(-1)^n 5n}{7n-2}$$

$$\text{q) } \sum_{n=2}^{\infty} \frac{(-1)^n}{n\sqrt{\ln n}}$$

$$\text{w) } \sum_{n=2}^{\infty} \frac{e^{1/n}}{n^2}$$

$$\text{f) } \sum_{n=0}^{\infty} \frac{1}{n^2+3n+2}$$

$$\text{l) } \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{n^3+1}$$

$$\text{r) } \sum_{n=2}^{\infty} \frac{n \ln n}{(n+1)^3}$$

## Answers

1. 2. See handout Sequences Part 2
3. a) converges absolutely    b) diverges    c) converges absolutely    d) converges absolutely  
e) converges absolutely    f) converges absolutely    g) diverges    h) converges conditionally  
i) diverges    j) converges absolutely    k) diverges    l) converges conditionally  
m) converges absolutely    n) diverges    o) converges absolutely  
p) converges absolutely    q) converges conditionally    r) converges absolutely  
s) converges absolutely    t) converges absolutely    u) converges conditionally  
v) diverges    w) converges absolutely