Quiz 12 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quizzes 1-11 and Exams 1, 2
2. Power Series and Taylor Series

Sample Quiz 12

1. Determine whether the following series converges absolutely, converegs conditionally, or diverges. Justify your answer by computation.

   a) $\displaystyle\sum_{n=0}^{\infty}\frac{2n+1}{n^2+1}$ b) $\displaystyle\sum_{n=0}^{\infty}\frac{n^3\cdot 10^{2n}}{n!}$ c) $\displaystyle\sum_{n=1}^{\infty}\frac{(-10)^n}{n^n}$

2. Compute the interval of convergence in $\displaystyle\sum_{n=1}^{\infty}\frac{x^n}{(-2)^{n+1}n}$.

3. a) What is the taylor series for $f(x)=\ln(1+x)$ at $x=0$? Also state the interval of convergence.

   b) Find the Taylor series for $f(x)=\cosh x$ at $x=0$.

4. Find the sum of the series

$$\frac{1}{\sqrt{3}}-\frac{1}{3\left(\sqrt{3}\right)^3}+\frac{1}{5\left(\sqrt{3}\right)^5}-\frac{1}{7\left(\sqrt{3}\right)^7}+\ldots=\sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)\left(\sqrt{3}\right)^{2n+1}}$$

Answers

1. a) diverges by the comparison test: $\displaystyle\frac{2n+1}{n^2+1}\geq\frac{2n}{n^2+n^2}=\frac{1}{n}$

   b) converges absolutely by the ratio test

   c) converges absolutely by the root test

2. $(-2,2]$ The series converges conditionally at $x=2$

3. a) $\ln(1+x)=x-\frac{1}{2}x^2+\frac{1}{3}x^3-\frac{1}{4}x^4+\frac{1}{5}x^5-\frac{1}{6}x^6\ldots.$ $(-1,1]$

   b) $\displaystyle 1+\frac{x^2}{2}+\frac{x^4}{4!}+\frac{x^6}{6!}+\ldots.=\sum_{n=0}^{\infty}\frac{x^{2n}}{(2n)!}$

4. $\arctan\left(\frac{1}{\sqrt{3}}\right)=\frac{\pi}{6}$