Homework 53

The **due date** for this homework is **Tue 7 May 2013 12:00 AM EDT -0400**.

This homework has a small number of problems, but each contains many sub-problems. Don't be surprised if it takes longer than you think to solve them. The practice will be good for you!

Question 1

For which of the following series does the *alternating test* ensure **convergence**?

- $\sum_{n=1}^{\infty}(-1)^n \ln^2\left(\cos\frac{1}{n}\right)$
- $\sum_{n=1}^{\infty}(-1)^n \ln\frac{n+1}{n}$
- $\sum_{n=0}^{\infty}(-1)^n \frac{(n^2)!}{(2n)!}$
- $\sum_{n=1}^{\infty}(-1)^n \arctan(\pi n)$
- $\sum_{n=0}^{\infty}(-1)^n \frac{(n!)^2}{(2n)!}$
- $\sum_{n=1}^{\infty}(-1)^n \frac{2n-1}{2n+1}$
- $\sum_{n=1}^{\infty}(-1)^n \left(\frac{3n-1}{n^2}\right)^n$
- $\sum_{n=0}^{\infty}(-1)^n$

- $\sum_{n=1}^{\infty}(-1)^n \arctan\frac{1}{n}$
- $\sum_{n=0}^{\infty}(-1)^n\left(\frac{-1}{5}\right)^n$

Question 2

Which of the following series converge *conditionally*?

- $\sum_{n=1}^{\infty}(-1)^n\left(\frac{n+2}{n^2}\right)^n$
- $\sum_{n=1}^{\infty}(-1)^n \ln^2\left(\cos\frac{1}{n}\right)$
- $\sum_{n=1}^{\infty}(-1)^n ne^{-n}$
- $\sum_{n=1}^{\infty}(-1)^n \frac{2+(-1)^n}{3+(-1)^n}$
- $\sum_{n=1}^{\infty}(-1)^n \sin\frac{1}{n}$
- $\sum_{n=1}^{\infty}(-1)^n \frac{1}{\sqrt{n(n+2)}}$
- $\sum_{n=1}^{\infty}(-1)^n n^2 \tan\frac{1}{n^3}$
- $\sum_{n=1}^{\infty}(-1)^n \frac{(2n)!}{1\cdot 3\cdot 5\cdots(2n-1)}$
- $\sum_{n=1}^{\infty}(-1)^n \ln\frac{n+1}{n}$
- $-\frac{1}{3}+\frac{1\cdot 3}{3\cdot 5}-\frac{1\cdot 3\cdot 5}{3\cdot 5\cdot 7}+\cdots+(-1)^n\frac{1\cdot 3\cdot 5\cdots(2n-1)}{3\cdot 5\cdot 7\cdots(2n+1)}+\cdots$

☐ In accordance with the Honor Code, I certify that my answers here are my own work.

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