Calculus 2: Series Are NOT Scary! (part 3)

things you need: test for divergence, geometric series, telescoping series, p-series, integral test, direct comparison test, limit comparison test, alternating series test, ratio test, and root test.

(Q1.) $\frac{1}{2}-\frac{1}{2}+\frac{3}{8}-\frac{1}{4}+\frac{5}{32}-\cdots$

(Q2.) $\frac{1}{2}+\frac{1}{2}+\frac{3}{8}+\frac{1}{4}+\frac{5}{32}+\cdots$

(Q3.) $\frac{\sin(1)}{2}+\frac{\sin(2)}{5}+\frac{\sin(3)}{10}+\frac{\sin(4)}{17}+\cdots$

(Q4.) $\frac{1}{(\ln 2)^2}+\frac{1}{(\ln 3)^3}+\frac{1}{(\ln 4)^4}+\frac{1}{(\ln 5)^5}+\cdots$

(Q5.) $\sum_{n=1}^{\infty}\frac{(-1)^n}{\sqrt{3n+1}}$

(Q6.) $\sum_{n=1}^{\infty}\left(1-\frac{1}{n}\right)^n$

(Q7.) $\sum_{n=1}^{\infty}\frac{n!}{e^{n^2}}$

(Q8.) $\sum_{n=1}^{\infty}\frac{(2n)!}{n^n}$

#bprplive

More practice:

(P1.) $\sum_{n=1}^{\infty}\left(1-\frac{1}{n}\right)^{n^2}$

(P2.) $\sum_{n=1}^{\infty}\frac{\cos(\pi n)}{n+\pi}$

(P3.) $\sum_{n=1}^{\infty}\frac{(n+1)^2}{n!}$

(P4.) $\sum_{n=1}^{\infty}\frac{(-1)^n}{\tan^{-1}(n)}$

(P5.) $\sum_{n=1}^{\infty}\frac{(-3)^n n!}{n^n}$

(P6.) $\sum_{n=1}^{\infty}\cos\left(\frac{1}{n!}\right)$

(P7.) Given an example of a_n so that both $\sum_{n=1}^{\infty}a_n$ and $\sum_{n=1}^{\infty}(a_n)^2$ diverge

(P8.) Given an example of a_n so that $\sum_{n=1}^{\infty}a_n$ converges but $\sum_{n=1}^{\infty}(a_n)^2$ diverges