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

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

(Q1.) $\frac{1}{3}+\frac{1}{8}+\frac{1}{15}+\frac{1}{24}+\cdots$

(Q2.) $\frac{1}{2}+\frac{4}{9}+\frac{9}{28}+\frac{16}{65}+\cdots$

(Q3.) $\frac{1}{\ln(2^4)}+\frac{1}{\ln(3^9)}+\frac{1}{\ln(4^{16})}+\frac{1}{\ln(5^{25})}+\cdots$

(Q4.) $\frac{\sqrt{2}}{2}+\frac{\sqrt[3]{2}}{3}+\frac{\sqrt[4]{2}}{4}+\frac{\sqrt[5]{2}}{5}+\cdots$

(Q5.) $\sum_{n=3}^{\infty}\frac{1}{n(\ln n)^2}$

(Q6.) $\sum_{n=1}^{\infty}\sin\left(\frac{1}{n^2}\right)$

(Q7.) $\sum_{n=1}^{\infty}\frac{2^n}{3^n+4}$

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

#bprplive

More practice:

(P1.) Which of the following series ***converges***?

(A) $\frac{1}{1^{\ln 2}}+\frac{1}{2^{\ln 2}}+\frac{1}{3^{\ln 2}}+\frac{1}{4^{\ln 2}}+\cdots$

(B) $\frac{1}{\ln 2}+\frac{1}{(\ln 2)^2}+\frac{1}{(\ln 2)^3}+\frac{1}{(\ln 2)^4}+\cdots$

(C) $\frac{\ln 2}{1}+\frac{\ln 2}{2}+\frac{\ln 2}{3}+\frac{\ln 2}{4}+\cdots$

(D) $(\ln 2)+(\ln 2)^2+(\ln 2)^3+(\ln 2)^4+\cdots$

(E) $\frac{1}{\ln 2}+\frac{1}{\ln(2^2)}+\frac{1}{\ln(2^3)}+\frac{1}{\ln(2^4)}+\cdots$

(P2.) Given $\sum_{n=1}^{\infty} a_n$ diverges and $a_n \geq 0$ for all n. Which of the following must also ***diverge***?

(A) $\sum_{n=1}^{\infty}(a_n)^2$

(B) $\sum_{n=1}^{\infty}\frac{1}{a_n}$

(C) $\sum_{n=1}^{\infty}\frac{a_n}{n}$

(D) $\sum_{n=1}^{\infty}\sqrt{a_n}$

(E) None of these

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

(P4.) $\sum_{n=3}^{\infty}\frac{1}{\sqrt{n}\ln n}$, hint: $\ln n < \sqrt{n}$ for all n

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

(P6.) $\sum_{n=1}^{\infty}\sin^2\left(\frac{1}{n}\right)$

(P7.) $\sum_{n=1}^{\infty}\cos^2\left(\frac{1}{n}\right)$

(P8.) $\sum_{n=1}^{\infty}\frac{5^n}{3^n+4^n}$