Calculus 2: Does a_n Converge vs. Does $\sum a_n$ Converge

things you need: test for divergence, geometric series, telescoping series, p-series

note: n starts with 1

(Q1.) $\frac{3}{5}, \frac{-1}{5}, \frac{1}{15}, \frac{-1}{45}, \frac{1}{135}, \ldots$

(Q2.) $\frac{7}{15}, \frac{8}{19}, \frac{9}{23}, \frac{10}{27}, \frac{11}{31}, \ldots$

(Q3.) $\sin(2), 2\sin(1), 3\sin(\frac{2}{3}), 4\sin(\frac{1}{2}), 5\sin(\frac{2}{5}), \ldots$

(Q4.) $1, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{3}}, \frac{1}{2}, \frac{1}{\sqrt{5}}, \ldots$

(Q5.) $a_n = \left(1-\frac{1}{n}\right)^n$

(Q6.) $a_n = e^{\frac{1}{n}} - e^{\frac{1}{n+2}}$

(Q7.) $a_n = \frac{1}{\sqrt{n}+\sqrt{n+1}}$

(Q8.) $a_n = 2^{-2n}7^n$

#bprplive

More practice:

(P1.) $a_n = \frac{3^n}{3^n+n^3} - \frac{n^3}{n^3+3^n}$

(P2.) $a_n = \tan^{-1}(n) - \tan^{-1}(n+1)$

(P3.) $a_n = \cos(\pi n)$

(P4.) $a_n = 3^{-2n}5^n$

(P5.) $\frac{1}{4}, \frac{1}{8}, \frac{1}{12}, \frac{1}{16}, \frac{1}{20}, \ldots$

(P6.) $\frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}, \ldots$

(P7.) $\frac{1}{3}, \frac{1}{8}, \frac{1}{15}, \frac{1}{24}, \frac{1}{35}, \ldots$

(P8.) $\frac{1}{5}, \frac{1}{4}, \frac{3}{11}, \frac{2}{7}, \frac{5}{17}, \ldots$