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Math 2020, Winter 2007, Quiz 10  
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Determine whether or not the following series converge and explain how you know.

$$(1) \sum \frac{2^n}{3^n+1} \quad (2) \sum \frac{n^2+1}{n^5+n^3+1}$$

1.  $\frac{2^n}{3^n+1} < \frac{2^n}{3^n} = \left(\frac{2}{3}\right)^n$  and  $\sum \left(\frac{2}{3}\right)^n$  converges

(geometric with  $r = 2/3$ ) so  $\sum \frac{2^n}{3^n+1}$  converges.

2.  $\frac{\frac{n^2+1}{n^5+n^3+1}}{\frac{1}{n^3}} = \frac{n^5+n^3}{n^5+n^3+1} \rightarrow 1$  as  $n \rightarrow \infty$

and  $\sum \frac{1}{n^3}$  converges (p-series,  $p=3$ )

so  $\sum \frac{n^2+1}{n^5+n^3+1}$  converges.