JANUARY 14

Which of the following series converge?
What do they converge to?

$\frac{9}{5} \geq 1$

$$\sum_{n=1}^{\infty}\left(\frac{3}{4}\right)^{n} \qquad \sum_{n=1}^{\infty}8\left(\frac{5}{6}\right)^{n-1} \qquad \sum_{n=1}^{\infty}\frac{1}{5^{n}} \qquad \sum_{n=1}^{\infty}\left(\frac{9}{5}\right)^{n}$$

diverge

$r=\frac{3}{4}<1$ $\quad r=\frac{5}{6}<1$ $\quad r=\frac{1}{5}<1$

$$\frac{\frac{3}{4}}{1-\frac{3}{4}}=\frac{\frac{3}{4}}{\frac{1}{4}}=3 \qquad \frac{8}{1-\frac{5}{6}}=\frac{8}{\frac{1}{6}}=8\cdot\frac{6}{1}=48 \qquad \frac{\frac{1}{5}}{1-\frac{1}{5}}=\frac{\frac{1}{5}}{\frac{4}{5}}=\frac{1}{4}$$

JANUARY 14

Students will verbally explain how to determine if a p-series converges

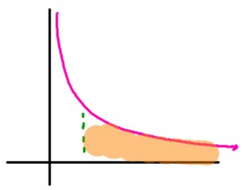
(using the words:
ratio, converge, diverge...)

$$\int_1^\infty \frac{1}{x^p}\,dx$$

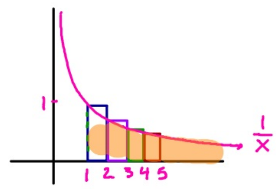
if $p > 1$, then the integral converges

if $p \le 1$, then the integral diverges

$$\int_1^\infty \frac{1}{x^1}\,dx$$



Diverges
$p=1$



$$1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\cdots+\frac{1}{n}+\cdots$$

$$=\sum_{n=1}^{\infty}\frac{1}{n}$$

Diverges

Harmonic Series

$$\sum_{n=1}^{\infty}\frac{1}{n}$$

Diverges

P-series

$$\sum_{n=1}^{\infty}\frac{1}{n^p}$$

Converges for $p > 1$

Diverges for $p \le 1$

Converge	Diverge
$\sum_{n=1}^{\infty} \frac{n+3}{n^3-7}$	$\sum_{n=1}^{\infty} \frac{1}{n^{-2}}$ $\quad$ $\sum_{n=1}^{\infty} n^2$
$\sum_{n=1}^{\infty} \frac{1}{n^6}$	$\sum_{n=1}^{\infty} \frac{n^4-n^2+7}{n^2-10}$
$\sum_{n=1}^{\infty} \frac{5}{n^4}$	$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ $\quad$ $\sum_{n=1}^{\infty} \frac{1}{2n^{-3}}$

Geometric Series

∞ $\qquad$ $n-1$

$$\sum_{n=1}^{\infty} \frac{1}{n^p}$$

Converges if $p > 1$

Diverges if $p \leq 1$

* if $p=1$ you have the harmonic series

P-series