- Assignment 9 due on March 25
- Today: Absolute and conditional convergence
- Monday: Ratio test **(Watch Videos 13.18, 13.19)**

True or False - Absolute Values

1. IF $\{a_n\}_{n=1}^{\infty}$ is convergent, THEN $\{\,|a_n|\,\}_{n=1}^{\infty}$ is convergent.

2. IF $\{\,|a_n|\,\}_{n=1}^{\infty}$ is convergent, THEN $\{a_n\}_{n=1}^{\infty}$ is convergent.

3. IF $\displaystyle\sum_{n=1}^{\infty} a_n$ is convergent, THEN $\displaystyle\sum_{n=1}^{\infty} |a_n|$ is convergent.

4. IF $\displaystyle\sum_{n=1}^{\infty} |a_n|$ is convergent, THEN $\displaystyle\sum_{n=1}^{\infty} a_n$ is convergent.

Absolutely convergent or conditionally convergent?

1. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{0.5}}$

2. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{1.5}}$

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

4. $\displaystyle\sum_{n=1}^{\infty} \frac{\sin n}{n^{0.5}}$

5. $\displaystyle\sum_{n=1}^{\infty} \frac{\sin n}{n^{1.5}}$

6. $\displaystyle\sum_{n=1}^{\infty} \frac{\sin n}{\arctan n}$

Convergence tests: ninja level

We know

- $\forall n \in \mathbb{N},\ a_n > 0.$
- the series $\sum_{n}^{\infty} a_n$ is convergent

Determine whether the following series are convergent, divergent, or we do not have enough information to decide:

1. $\sum_{n}^{\infty} \sin a_n$
2. $\sum_{n}^{\infty} \cos a_n$
3. $\sum_{n}^{\infty} \sqrt{a_n}$
4. $\sum_{n}^{\infty} (a_n)^2$

Positive and negative terms - 1

- Let $\sum a_n$ be a series.
- Call $\sum$(P.T.) the sum of only the positive terms of the same series.
- Call $\sum$(N.T.) the sum of only the negative terms of the same series.

IF $\sum$(P.T.) is...	AND $\sum$(N.T.) is...	THEN $\sum a_n$ may be...
CONV	CONV	
∞	CONV	
CONV	$-\infty$	
∞	$-\infty$	

Positive and negative terms - 2

- Let $\sum a_n$ be a series.
- $\sum$(P.T.) $=$ sum of only the positive terms of the same series.
- $\sum$(N.T.) $=$ sum of only the negative terms of the same series.

	$\sum$(P.T.) may be...	$\sum$(N.T.) may be...
If $\sum a_n$ is CONV		
If $\sum \lvert a_n \rvert$ is CONV		
If $\sum a_n$ is ABS CONV		
If $\sum a_n$ is COND CONV		
If $\sum a_n = \infty$		
If $\sum a_n$ is DIV oscillating		