Office hours through the end of classes

A few changes

- Thursday, March 26: from 12:30–2:00pm (one hour earlier than usual)
- Monday, March 30: usual time (11:00am–12:30pm), but I might be late (a PhD student is defending their dissertation that morning)
- Thursday, April 2: 1:30–3:00pm as usual
- Monday, April 6: University holiday, so no in-person office hours; I'll hold Piazza office hours from 11:00am–12:30pm
- Thursday, April 9: 1:30–3:00pm as usual

I'll post the changes on our section's web page.

Monday, March 23

Clicker Questions

Clicker Question 1

A series with a parameter

Using the Ratio Test, determine values of C for which the series

$$\sum_{n=1}^{\infty} \frac{\tan^{-1} n}{(-3)^n} C^n$$

converges and diverges.

Bigger or smaller than 1?

$$\lim_{n\to\infty} \left| \frac{a_{n+1}}{a_n} \right|$$

$$= \lim_{n\to\infty} \frac{\tan^{-1}(n+1) \cdot |C|^{n+1}/3^{n+1}}{\tan^{-1} n \cdot |C|^n/3^n}$$

$$= \lim_{n\to\infty} \left(\frac{\tan^{-1}(n+1)}{\tan^{-1} n} \cdot \frac{|C|}{3} \right)$$

$$= \frac{\pi/2}{\pi/2} \frac{|C|}{3} = \frac{|C|}{3}.$$

A. converges for $-3 < C < 3$; diverges for $C > 3$ and $C < -3$

B. converges for $-\frac{1}{3} < C < \frac{1}{3}$; diverges for $C > \frac{1}{3}$ and $C < -\frac{1}{3}$

C. converges for $0 < C < \frac{1}{3}$; diverges for $C > \frac{1}{3}$ and $C < 0$

D. converges for $-3 < C < 0$; diverges for $C > 0$ and $C < -3$

E. none of the above

Clicker Question 2

An off-centre power series

On which of the following intervals does $\sum_{n=0}^{\infty} 2n^3(x-5)^n$ converge?

A. $-6 < x < -4$

B. $4 < x < 6$

C. $-6 < x < 6$

D. $-1 < x < 1$

E. none of the above

Still the Ratio Test

$$\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = \lim_{n\to\infty}\frac{2(n+1)^3|x-5|^{n+1}}{2n^3|x-5|^n}$$

$$= \lim_{n\to\infty}\frac{(n+1)^3}{n^3}|x-5|$$

$$= |x-5|.$$

And $|x-5| < 1$ precisely when $4 < x < 6$. (Check $x = 4$ and $x = 6$ separately, using the Test for Divergence.)