# Math 131 Day 41

My Office Hours: M & W 12:30–2:00, Tu 2:30–4:00, & F 1:15-2:30 or by appointment. **Math Intern** Sun: 12–6pm; M 3-10pm; Tu 2–6, 7–10pm; W and Th: 5-10 pm in Lansing 310. Website: `http://math.hws.edu/~mitchell/Math131S13/index.html`.

**Math Intern Hours for next week:** Dave Brown is working this upcoming Sunday and Monday as normal and then taking Tuesday the last day of classes off. Then his schedule will be:

**1)** Wed 5/8 3-9

**2)** Thur 5/9 2-5 6-9

**3)** Fri 5/10 12-6

**4)** Sat 5/11 12-6

**5)** Sun 5/12 12-6

**6)** Mon 5/13 12-6

**Final Exam: Monday, May 13, 2013 at 1:30PM–4:30PM in our classroom**

## Review Session

Thursday, May 3rd at 10–12:00 am in Gulick 206a. Look for Practice Questions on line starting on Monday. In the mean time, review the Labs, especially Labs 13 and 14. The answers to all the labs and all the homework are on line.

## Practice

**Review Section 9.3** on **Taylor/MacLaurin series** through page 614. Try; Page 621 #9, 11, 13, 17, 19.

**1. Vocabulary**: power series, radius of convergence, interval of convergence, Taylor series, MacLaurin Series.

## Hand In Monday

**Be neat. Carefully justify your work**. Make this your best assignment.

**0.** Last WeBWorK: Do `TaylorSeries` and `Day40B`.

**1.** Find the Radius and Interval of Convergence. This requires finding the radius of convergence and then checking the endpoints. **Note:** There are lots of similar problems on line in the answers to Lab 14.

**a)** Page 609 #16

**b)** $\displaystyle\sum_{n=1}^{\infty} \frac{(x-3)^{2n}}{4^n n}$.

**2.** Page 621 #10 (Read the directions.) Inside derivative!

**3.** Page 621 #14 (Read the directions.) Inside derivative! Keep track of the powers of 2 and the factorial.

**4.** Page 621 #18 (Read the directions.) Keep track of the powers.

**5.** Page 621 #20 (Read the directions.) Keep track of the powers and the factorial.

**6. Bonus:** See the last page.

| | Series | Test | Intuition/Reasoning |
|---|---|---|---|
| 1 | $\sum_{k=1}^{\infty} \frac{(k!)^2}{(2k)!}$ | | |
| 2 | $\sum_{k=1}^{\infty} \left(\frac{1}{k} + 3^{-k}\right)$ | | |
| 3 | $\sum_{k=2}^{\infty} \frac{3 \ln k}{k}$ | | |
| 4 | $\sum_{k=1}^{\infty} \frac{3^k k!}{k^k}$ | | |
| 5 | $\sum_{k=1}^{\infty} \left(1 - \frac{1}{k}\right)^{k^2}$ | | |
| 6 | $\sum_{k=1}^{\infty} \frac{k^6}{k^8 + 3}$ | | |
| 7 | $\sum_{k=1}^{\infty} \frac{1}{(1+q)^k}, q > 0$ | | |
| 8 | $\sum_{k=1}^{\infty} \frac{1}{k^{1+q}}, q > 0$ | | |
| 9 | $\sum_{k=3}^{\infty} \frac{1}{k^2 \ln k}$ | | |
| 10 | $\sum_{k=1}^{\infty} \ln\left(\frac{k+3}{k+2}\right)$ | | |
| 11 | $\sum_{k=1}^{\infty} k^{-\frac{1}{k}}$ | | |
| 12 | $\sum_{k=1}^{\infty} (-1)^k \frac{k^3}{k^4 + 1}$ | | |
| 13 | $\sum_{k=1}^{\infty} (-1)^k \frac{k!}{(2k)!} x^k$ | | |
| 14 | $\sum_{k=1}^{\infty} \frac{k}{3^{2k}} (x-1)^k$ | | |
| 15 | $\sum_{k=1}^{\infty} (-1)^k \frac{2k^4 + 1}{6k^7 + k}$ | | |
| 16 | $\sum_{k=1}^{\infty} \left(1 - \frac{4}{k}\right)^k$ | | |
| 17 | $\sum_{k=0}^{\infty} \pi (-4)^k 7^{-k}$ | | |

## Extra Credit: Due by Tuesday at Noon. Name: ________________________

Do this problem for extra points on the homework portion of your grade. **Show all work.** First read this beautiful poem by Amy Quan Barry that appeared in the *New Yorker.* Then solve the differential equation in the title of the poem. That is, find

$$\int \frac{4x^3 + x^2 - 12}{\sqrt{2x^2 - 9}}\, dx.$$

What technique should you try? **Show all of your work.**

IF $\frac{\mathbf{dy}}{\mathbf{dx}} = \frac{\mathbf{4x^3 + x^2 - 12}}{\sqrt{\mathbf{2x^2 - 9}}}$ THEN

you are standing at the ocean,
in the moon's empirical light
each mercurial wave

like a parabola shifting on its axis,
the sea's dunes differentiated & graphed.
*If this, then that.* The poet

laughs. She wants to lie
in her own equation, the point slope
like a woman whispering *stay me*

*with flagons.* What is it to know the absolute value
of negative grace, to calculate
how the heart becomes the empty set

unintersectable, the first & the last?
But enough.
You are standing on the shore,

the parameters like wooden stakes.
Let $x$ be the moon like a notary.
Let $y$ be all things left unsaid.

Let the constant be the gold earth
waiting to envelop what remains,
the sieves of the lungs like two cones.

—*Amy Quan Barry*