

Math 131 Day 28

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>.

Practice

Review all of Chapter 7.7 on improper integrals which we will finish today. Also see the online notes. **Read Section 8.1** on Sequences which we will discuss next time.

1. a) Try page 510 #5, 9, 13, 17.
b) Page 510 #27, 29, 31.

Hand In at Lab: These are time-consuming

Use correct notation with limits! Papers with incorrect notation will be marked down. Potential answers: Diverges, $-3/2$, -1 , 0 , $1/2$, $2/3$, 1 , $3/2$, one of your answers should be equivalent to $\ln 64$, $3\pi/32$, $3\pi^2/32$, $3\pi^2/16$, $\pi^2/2$, $\pi[\pi/2 - \arctan 2]$, $\pi/2 - \arctan 2$, $3 \ln |x-1| - 3 \ln |x+2| + c$, $-3 \ln |x-1| + 3 \ln |x+2| + c$.

0. Work on WeBWork Day28 and finish Day27. Also there are new WeBWork Extra Credit problems.

1. Page 510 #20. First determine the indefinite integral (what technique applies?). Then evaluate it with the appropriate limits.

2. Page 510 #22. This one should be easier.

3. Determine $\int_0^1 \frac{dx}{\sqrt[3]{x-1}}$. Is this improper? If so, use the appropriate limits.

4. Evaluate $\int_0^e \ln x^2 dx$. (Why/where is this improper?). First determine the indefinite integral—you can simplify the integrand—what technique should you use. Then evaluate it with the appropriate limits.

5. This is a WeBWork problem. So Check your answer on WeBWork before handing this in.

a) Determine $\int \frac{9}{x^2 + x - 2} dx$. What technique must you use to do the integration? Simplify your answer using log properties.

b) Use your work in part (a) to help determine $\int_2^\infty \frac{9}{x^2 + x - 2} dx$. How do you evaluate the limit?

c) Now determine $\int_1^2 \frac{9}{x^2 + x - 2} dx$. (Why/where is it improper?)

6. OK, here's an easy one. The p -power theorem will be very important. Use it to determine these improper integrals. Do not do any integration. Just use the theorem. Just give the answers. You should not be doing any integration.

a) $\int_1^\infty \frac{1}{x^3} dx$ b) $\int_1^\infty \frac{1}{x^{1/3}} dx$ c) $\int_1^\infty \frac{1}{x} dx$ d) $\int_1^\infty \frac{1}{x^{5/3}} dx$

7. **Bonus:** First determine $\int e^{-x} \cos x dx$. Then use your answer to determine $\int_0^\infty e^{-x} \cos x dx$. Show your work.