# Math 131 Homework Day 29

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

Today we will finish improper integrals. Our next topic will be Sequences.

**1.** Make a last review Section 7.7 on improper integrals. Review the $p$-Power Theorem in your notes. This theorem will be useful in the next few weeks.

**2.** **Read Section 8.1** on Sequences. They are lot's of fun.

**3.** Practice Problems on page 510: #27, 29, 31, and 37.

**4.** Practice Problems on page 524: #29, 31.

**5.** Practice Problems on page 534–5: #9, 11, 13, 15, 17(a,c), and 21(a,c).

## Hand In

**0.** Finish WeBWorK `Day 28` and start `Day 29B`.

**1.** **a)** Determine $\displaystyle\int \frac{8}{x^2+2x-3}\,dx$.

**b)** Using your work in part (a) determine $\displaystyle\int_2^\infty \frac{8}{x^2+2x-3}\,dx$. Use proper notation.

**c)** Determine $\displaystyle\int_0^1 \frac{8}{x^2+2x-3}\,dx$. Use proper notation.

**2.** Evaluate each of these integrals by using the $p$-Power Theorem. You should not need to do any antidifferentiation.

**a)** $\displaystyle\int_1^\infty \frac{1}{x^{5/4}}\,dx$ **b)** $\displaystyle\int_1^\infty \frac{1}{x^{2/3}}\,dx$ **c)** $\displaystyle\int_1^\infty \frac{2}{x^7}\,dx$ **d)** $\displaystyle\int_1^\infty \frac{1}{x^{-15}}\,dx$

**3.** **a)** Determine $\displaystyle\int \frac{4x^3}{(1+x^4)^2}\,dx$.

**b)** You need to do one example of an improper integral on $(-\infty,\infty)$. Determine: $\displaystyle\int \frac{4x^3}{(1+x^4)^2}\,dx$. Use the correct limit process.

**4.** **a)** page 534 #10.

**b)** Page 535 #16. (The next four terms up to $a_5$.)

**c)** Find an explicit formula for for the general $n$th term $a_n$ of the sequence $\{\frac{1}{2},\frac{1}{4},\frac{1}{6},\frac{1}{8},\ldots\}$.

**d)** Find an explicit formula for for the general $n$th term $a_n$ of the sequence $\{\frac{1}{4},\frac{2}{9},\frac{3}{16},\frac{4}{25},\ldots\}$.

**e)** Find a **recurrence** formula for for the general $n$th term $a_n$ of the sequence $\{64,32,16,8,4,\ldots\}$.

**5.** Determine the limit of the following sequences. Use any appropriate limit technique.

**a)** $a_n = \dfrac{n(n+1)(2n+1)}{9n^3}$; $n = 1,2,3,\ldots$

**b)** $a_n = \left(1+\dfrac{4}{n}\right)^n$; $n = 1,2,3,\ldots$

**c)** $a_n = n\sin(\frac{1}{n})$; $n = 1,2,3,\ldots$

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**6.** Determine whether each of the following integrals is improper. If it is, just rewrite it using the correct limit expression. DO NOT EVALUATE it. For example, $\displaystyle\int_2^4 \frac{x}{x-4}\,dx = \lim_{b\to 4^-}\int_2^b \frac{x}{x-4}\,dx$.

**a)** $\displaystyle\int_1^3 \frac{x-3}{x^2+3x-4}\,dx$ **b)** $\displaystyle\int_1^3 \frac{x-3}{x^2+4}\,dx$ **c)** $\displaystyle\int_1^3 \frac{x-3}{x^2-4}\,dx$