Classical Algebra

Math 326

Assignments

Fall Semester, 2008

Assignments are listed by the **date due**. A PDF version of this page is available for printing.

Most of these assignments consist of practice exercises designed to prepare you for the quizzes and the written assignments. Those which are to be submitted as written assignments are so labeled. While you may find it helpful to discuss the practice exercises with others, no collaboration is permitted on the problems in the written assignments.

Fri., Dec. 12:

> **Final Examination**, 10:30 – 12:30, in ES 143

Exam Period Office Hours

> | | | |
> |---|---|---|
> | Wed. | Dec. 10 | 2:30 – 4:00 |
> | Thurs. | Dec. 11 | 2:30 – 4:00 |

Fri., Dec. 5:

> **Handout: Solutions** for Written Assignment No. 5

Thu., Dec. 4:

> **Last regular class meeting:**
> • Written Assignment No. 5 (also available as PDF) is due.
> • Bring questions for review.

Tue., Dec. 2:

> Expect a **quiz**.
> **Read:** §§ 28B, 28C
> **Exercises:**
>
> > **351:** 13, 15
> > **356:** 6, 7, 10
> > **418:** 8, 11, 12
> > **421:** 1, 2, 5 – 7
> > **425:** 4 – 6, 9 – 12

Tue., Nov. 25:

> **Read:** §§ 24A, 28A
> **Exercises:**
>
> > **252:** 14, 15
> > **263:** 11
> > **307:** 8 – 10, 12, 14
> > **350:** 9, 10, 12
> > **356:** 2 – 5
> > **416:** 2, 3, 5, 6
> > • Recall that rational numbers, i.e., integer ratios, have decimal expansions relative to a given base. Find the analogous expansion for the ratio of polynomials with coefficients in $\mathbf{F}_5$
> >
> > $$\frac{1}{x - 2}$$
> >
> > relative to $(x + 1)$ as the polynomial base. Do the "digits" repeat for this example?

Thu., Nov. 20:

Expect a **quiz**.
Read: §§ 20A, 20B, 23A
Exercises:

> **251:** 10 – 13
> **257:** 3, 5, 6
> **262:** 7, 9, 10
> **303:** 1 – 5
> **309:** 1 – 3
> **350:** 2 – 4, 11

Tue., Nov. 18:

Written Assignment No. 4 (also available as PDF) is due.

Thu., Nov. 13:

Read: §§ 16A, 16B, 16C, 16D
Exercises:

> **243:** 10, 11
> **249:** 12, 13
> **252:** 11 – 13
> **257:** 1, 2
> **262:** 1 – 3, 6
> • Show that 2 is a primitive element in $\mathbf{Z}/m\mathbf{Z}$ for $m = 11$ and 19 but not for $m = 11 * 19 = 209$.
> • Find all roots of the polynomial $x^3 - 1$ in $(\mathbf{Z}/m\mathbf{Z})[t]$ for $m = 11$, 19, and 209.
> • What is the largest order of any element in $\mathbf{Z}/209\mathbf{Z}$?

Tues., Nov. 11:

Read: §§ 15C, 15D
Exercises:

> **205:** 7, 8
> **243:** 6, 7, 8
> **246:** 1 – 4, 6
> **248:** 6 – 10
> **251:** 7 – 9
> • Find primitive elements for $\mathbf{Z}/17\mathbf{Z}$, $\mathbf{Z}/23\mathbf{Z}$, and $\mathbf{Z}/34\mathbf{Z}$.
> • Show that there is no primitive element in $\mathbf{Z}/32\mathbf{Z}$.

Thu., Nov. 6:

Read: §§ 15A, 15B
Exercises:

> **163:** 18, 21, 22
> **200:** 13, 15
> **205:** 5, 6
> **236:** 4, 5
> **238:** 7 – 9
> **241:** 1
> **243:** 4, 5
> **245:** 1

Tue., Nov. 4:

Expect a **quiz**.
Read: §§ 12B, 14
Exercises:

> **141:** 18
> **163:** 15 – 17
> **200:** 5 – 7, 11, 12
> **202:** 1, 3

233: 1 – 3

Thu., Oct. 30:

Written Assignment No. 3 (also available as PDF) is due.

Tue., Oct. 28:

Read: §§ 10A, 10B, 12A
Exercises:

141: 16, 17, 19
145: 16, 17
163: 10, 11, 13, 14
166: 1, 2
169: 3, 4
196: 1 – 3

Thu., Oct. 23:

Midterm Test in class

Tue., Oct. 21:

Bring review questions
Read: § 9D
Exercises:

137: 7 – 9
142: 1, 4
144: 8
147: 2, 4, 6(i)

Thu., Oct. 16:

Expect a quiz.
Read: §§ 9A, 9B, 9C
Exercises:

110: 5(a) with $x_0 = 15$, 5(b) with $x_0 = 36$
123: 14, 15
133: 5 – 10
136: 1 – 5
141: 3 – 5, 7

Tue., Oct. 14:

Read: §§ 8A, 8B, 8C
Exercises:

89: 6, 7, 9 – 13
102: 3
105: 2
110: 4(c, d, e, f)
121: 1 – 5, 8, 9, 12, 13
125: 2 – 9

Thu., Oct. 9:

University recess: no class

Tue., Oct. 7:

Written Assignment No. 2 (also available as PDF) is due

Thu., Oct. 2:

Read: §§ 6E, 7C, 7D, 7E
Exercises:

74: 9
86: 5, 7 – 9

89: $1 - 5$
100: 1 (i – iv), 2
105: 1, 3
110: 4(a, b)

Tue., Sep. 30:

> **University recess:** no class

Thu., Sep. 25:

> **Read:** §§ 6A, 6B, 6C, 6D
> **Exercises:**
>
>> **54:** $32 - 34$
>> **67:** 9
>> **70:** 6
>> **72:** 4, 5
>> **73:** $2 - 8$
>> **80:** 3
>> **84:** $1 - 5$
>> **86:** $1 - 4$

Tue., Sep. 23:

> **Read:** §§ 5C, 5D, 5E
> **Exercises:**
>
>> **52:** 10, 11, 13, 15
>> **54:** 28, 30, 31
>> **65:** $6 - 8$
>> **67:** 2, 3, $5 - 8$
>> **70:** $1 - 5$
>> **72:** $1 - 3$
>> **73:** 1

Thu., Sep. 18:

> **Read:** §§ 4C, 5A, 5B
> **Exercises:**
>
>> **35:** 18
>> **50:** 3, 4
>> **51:** $3 - 5$, $7 - 9$
>> **53:** $19 - 21$, 25
>> **55:** 1
>> **64:** 1, 3, 4, 5

Tue., Sep. 16:

> Written Assignment No. 1 (also available as PDF) is due

Thu., Sep. 11:

> **Read:** §§ 3E, 4A, 4B
> **Exercises:**
>
> 1. **35:** 8, 9, 13, 20
> 2. **45:** 1, 3
> 3. **49:** 1, 2
> 4. **51:** 1, 2
> 5. Find the continued fraction expansion of:
>   (a) 40487/257.
>   (b) $\frac{1+\sqrt{5}}{2}$.
>   (c) $\sqrt{17}$.

Tue., Sep. 9:

> **Read:** Read the notes on *Continued Fractions*[1]
> **Exercises:**
>
> 1. **29:** 4, 6(ii, v)
> 2. **33:** 2, 3, 4(iii, iv, v)
> 3. **35:** 5, 6, 7(i, ii)
> 4. **And these:**
>   (a) Find the continued fraction expansions of the rational numbers
>   i. $\frac{61}{67}$.
>   ii. $\frac{44}{37}$.
>   (b) Find the continued fraction expansion of $\sqrt{2}$.
>   (c) Find the first three integers in the continued fraction expansion of $\sqrt[3]{5}$. (Feel free to use a calculator for this one.)
>   (d) Evaluate the finite continued fraction represented by the sequence $[3, 2, 7, 2]$.

Thu., Sep. 4:

> **Expect a quiz**
> **Read:** §§ 3B, 3C
> **Exercises:**
>
> > **23:** 5
> > **24:** 5
> > **27:** 6, 9, 10, 11
> > **29:** 2, 5, 6(iii, iv)
> > **33:** 4(i)
> > **And this:** Recall that 20314_5 was found to be 1334_{10}. Cipher in base 5 to convert this number from base 5 to base 7, and then check that result by converting it from base 7 to base 10.
>
> Supplementary course notes on Induction[2] (also available as PDF[3]) are available here.

Tue., Sep. 2:

> **Read:** §§ 2D – 2F, 3A, 3B
> **Exercises:**
>
> > **6:** 4
> > **11:** 6, 8
> > **18:** 2
> > **19:** 1
> > **23:** 1 – 4
> > **24:** 1 – 3
> > **27:** 5

Thu., Aug. 28:

> **Read:** §§ 1, 2A – 2C
> **Exercises:**
>
> > **6:** 2
> > **11:** 2, 4, 5, 10, 14
> > **15:** 2, 4
>
> If you wish to enter the writing intensive division of the course (Math 326Z), please be sure to submit the required essay[4] (also available as PDF[5]) at this class (or earlier).

Tue., Aug. 26:

> **First meeting:** no assignment.

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[1]URI: http://math.albany.edu/math/pers/hammond/course/cfrac/
[2]URI: http://math.albany.edu/math/pers/hammond/course/mat326/inds.xhtml
[3]URI: http://math.albany.edu/math/pers/hammond/course/mat326/inds.pdf
[4]URI: http://math.albany.edu/math/pers/hammond/course/mat326f2008/ab326wi.xhtml
[5]URI: http://math.albany.edu/math/pers/hammond/course/mat326f2008/ab326wi.pdf