Math 181: Problem Set #5

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Due in 1 week at the start of class.

Make sure you have read Chapters 7 to 11 of the *Archimedes Codex* and sections 4.1–4.3 (the sections on Archimedes) of the Katz textbook.

Problem 1

Figure 1 is part of the 2nd-century AD astronomical treatise *Almagest* by Ptolemy. (More precisely, it is a copy of the text produced in 1898 by the historian J. L. Heiberg.)

Find all the numbers in the text and then convert them to Arabic numerals (i.e. the usual numerals $1, 2, , 7812, ...$).

Problem 2

Solve Exercise 1 in Chapter 2 of the Katz textbook.

Problem 3

Solve Exercise 1 in Chapter 4 of the Katz textbook.

Problem 4

Both Chapter 6 ("Archimedes' Method, 1999 or The Making of Science") of *Archimedes Codex* and 4.1–4.3 of the Katz textbook contain a mathematical discussion of Archimedes's mathematics.

Write a paragraph comparing and contrasting the two treatments of Archimedes's mathematics. What does *Archimedes Codex* do well? What does the Katz textbook do well? When studying a mathematical topic, when you consult a text written like *Archimedes Codex*? When studying a mathematical topic, when would you consult a text written like the Katz textbook? Who would you recommend read *Archimedes Codex*? The Katz textbook? Anything else spring to mind?

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νουσαι διὰ τὸ τὰ ἀπ' αὐτῶν συντιθέμενα ποιεῖν τὸ
ἀπὸ τῆς διαμέτρου τετράγωνον· οἷον, ἐπειδὴ ἡ ὑπὸ
τὰς $\overline{λξ}$ μοίρας εὐθεῖα τμημάτων ἐδείχθη $\overline{λζ}$ $\overline{δ}$ $\overline{νε}$ καὶ
τὸ ἀπ' αὐτῆς $\overline{,ατοε}$ $\overline{δ}$ $\overline{ιε}$, τὸ δὲ ἀπὸ τῆς διαμέτρου
5 τμημάτων ἐστὶν $\overset{α}{\overline{Μ}}$ $\overline{,δυ}$, ἔσται καὶ τὸ μὲν ἀπὸ τῆς
ὑποτεινούσης τὰς λειπούσας εἰς τὸ ἡμικύκλιον μοίρας
$\overline{ρμδ}$ τῶν λοιπῶν $\overset{α}{\overline{Μ}}\overline{,γκδ}$ $\overline{νε}$ $\overline{με}$, αὐτὴ δὲ μήκει τῶν
αὐτῶν $\overline{ριδ}$ $\overline{ξ}$ $\overline{λζ}$ ἔγγιστα, καὶ ἐπὶ τῶν ἄλλων ὁμοίως.
     ὃν δὲ τρόπον ἀπὸ τούτων καὶ αἱ λοιπαὶ τῶν κατὰ
10 μέρος δοθήσονται, δείξομεν ἐφεξῆς προεκθέμενοι λημ-
μάτιον εὔχρηστον πάνυ πρὸς τὴν παροῦσαν πραγ-
ματείαν.
     ἔστω γὰρ κύκλος ἐγγεγραμμένον ἔχων τετράπλευρον
τυχὸν τὸ ΑΒΓΔ, καὶ ἐπεζεύχθωσαν αἱ ΑΓ καὶ ΒΔ.
15 δεικτέον, ὅτι τὸ ὑπὸ τῶν ΑΓ καὶ ΒΔ περιεχόμενον
ὀρθογώνιον ἴσον ἐστὶ συναμφοτέροις τῷ τε ὑπὸ τῶν
ΑΒ, ΔΓ καὶ τῷ ὑπὸ τῶν ΑΔ, ΒΓ. κείσθω γὰρ τῇ
ὑπὸ τῶν ΔΒΓ γωνίᾳ ἴση ἡ ὑπὸ ΑΒΕ. ἐὰν οὖν κοινὴν
προσθῶμεν τὴν ὑπὸ ΕΒΔ, ἔσται καὶ ἡ ὑπὸ ΑΒΔ
20 γωνία ἴση τῇ ὑπὸ ΕΒΓ. ἔστιν δὲ καὶ ἡ ὑπὸ ΒΔΑ

Figure 1: A selection from Ptolemy's *Almagest*

Collaboration Policy

With each week's homework, you must turn in a one paragraph description of all the resources you used on that homework. You must mention any person you talked to about the problems, any book you looked at, any online resource (Wikipedia, Chegg,...) that you used. A sample paragraph is

> On this week's homework, I worked on the problem set collaboratively with Gauss and Grothendieck at The Redroom during happy hour. We found an Alex Jones video (http://youtube.blah.com) that gave a really clear explanation of Fermat's Last Theorem. We got really stuck on Problem 5, and so we went to Chegg.com and paid an online tutor ("Zariski") $50 to solve the problem for us. He said the problem was too hard for him. So I logged into my TruthSocial account (@CobraTatesThesis) and posted the question with @realDonaldTrump tagged. He responded with a tremendous, really fantastic solution to the problem, which by the way, Biden can't solve. At this point, it was midnight and I still had four more problems to go, so I just gave the questions to ChatGPT and cut-and-pasted the answers.