CO 480 Week 3 Learning Goals

By the end of this week, students should be able to...

- Define Pell's Equation (or a Pell Equation).
- State some of the origins of Pell's Equations (for example, the Archimedes Cattle Problem).
- Explain some of the misattribution history of Pell's Equations.
- Describe some of the great works of Brahmagupta which could include zero, Pell's equation, Brahmagupta's Formula, Brahmagupta's Theorem, Indian arithmetic, quadratic equations, etc.
- Identify the two [major] books that Brahmagupta wrote and some of the topics covered in them.
- Explain how ideas managed to travel from Alexandria to India (and why this happened).
- Briefly discuss the Islam movement during the time of Brahmagupta and how this affected his work.
- Discuss the region around Bhinmal (say for example the Gurjara Dynasty).
- State and prove the composition formula discussed in class for Pell's Equations.
- Describe some of Bhāskara II's contributions to mathematics and identify some of his influences.
- Describe the two major contributions of Bhāskara II to solving Pell's Equations (figuring out the $k \in \{\pm 1, \pm 2, \pm 4\}$ cases and using a parameterized solution).
- State Lagrange's Theorem of 1768 with relation to Pell's Equations.
- We proved a classification theorem for all solutions of Pell's Equations. Be able to prove and extend some of the lemmas from this proof and how they play a role in the proof of the main theorem.
- Define a Fundamental Solution to a Pell Equation.
- Identify some of the history behind the first solution(s) to the Cattle Problem (specifically those by Amthor in 1880 and those by German, Zarnke and Williams in 1965).
- Be able to find a solution to a Pell Equation using some of the techniques from above.