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Abstract Algebra 342



Use the following link to answer the questions.

http://www.d.umn.edu/~jgallian/msproject06/project_xukai7.html

Chapter (1)

<u>Exersice 1</u>.
a. Find elements of U(30).
b. Find the inverse of each member of U(30).

Exercise 2.

Guess a formula for the size of $U(p^n)$. Make a conjecture about the relationship between the size of $U(2p^n)$ and the size of $U(p^n)$ where *p* is a prime greater than 2.

Exercise 3.

This software computes the inverse of any element in $GL(2, Z_p)$, where p is a prime. Computes the inverse of $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix} \mod 11$

Chapter (3)

Exercise 1.

Run the program for n = 30 to determine all cyclic subgroups. Compare the order of the subgroups with the order of the group itself. What arithmetic relationship do these integers have ?

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Chapter (4)

Exercise 1.

This software determines if U(n) is cyclic. Run the program for n = 8, 16, 32, 64, and 128. <u>Make a conjecture</u>. Run the program for 3, 9, 27, 81, 343, 5, 25, 125, 7, 49, 11, and 121. Make a conjecture. Run the program for n = 12, 20, 28, 44, 52, 15, 21, 33, 39, 51, 57, 69, 35, 55, 65, and 85. <u>Make a conjecture</u>.