CSU Math 301

Homework 7

Due Friday, October 25 at the beginning of class

Reading.
Sections 7.1, 7.2, 7.3

Remark. Make grammatically correct sentences by adding in just a few English words.

Problems.

1. Use the Euclidean algorithm to find $\gcd(63, 141)$, and also to write $\gcd(63, 141)$ as a linear combination of 63 and 141 (i.e. write $\gcd(63, 141) = m \cdot 63 + n \cdot 141$ for some $m, n \in \mathbb{Z}$).

2. Use the Euclidean algorithm to find the multiplicative inverse of 4 mod 19 (i.e., the integer y between 0 and 18 such that $4y \equiv 1 \bmod 19$).

3. Solve $4x \equiv 7 \bmod 19$, where x is an integer between 0 and 18.

4. A deck of cards consists of $52 = 13 \cdot 4$ cards: an ace, two, three, ..., nine, ten, jack, queen, and king (13 values) from each of 4 different suits: $\heartsuit, \diamondsuit, \clubsuit, \spadesuit$. A poker hand consists of a subset of 5 of these 52 cards.

   (a) How many different full house poker hands are there? A full house consists of triple of cards of the same value, plus a pair of cards of the same value. We consider the hands $\{K\heartsuit, K\diamondsuit, K\spadesuit, 2\clubsuit, 2\diamondsuit\}$ and $\{2\diamondsuit, K\spadesuit, 2\clubsuit, K\diamondsuit, K\heartsuit\}$ to be the same.

   (b) How many different two pair poker hands are there? A two pair consists of a pair of cards of one value, another pair of cards of a different value, and then a fifth card of a distinct value. We consider the hands $\{9\heartsuit, 9\diamondsuit, 5\spadesuit, 5\clubsuit, 2\diamondsuit\}$ and $\{5\spadesuit, 5\clubsuit, 9\heartsuit, 9\diamondsuit, 2\diamondsuit\}$ to be the same.