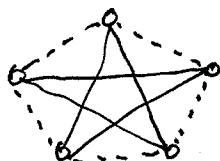


Math 110 Fall 2012
 HW 10 Solutions

6.2 #12 There are 25 possibilities for the pair $(a \bmod 5, b \bmod 5)$, hence any 26 ordered pairs of integers will include two for which the remainders mod 5 are the same.

6.2 #26 Let --- indicate friends and --- indicate enemies. Then this configuration of 5 contains no 3 mutual friends and no 3 mutual enemies:



6.2 #36 There cannot be a computer A which is connected to all others and also a computer B which is connected to no others, since A is either connected to B or not. So, either number of possible connections for each computer belongs to the 5 element set $\{0, \dots, 4\}$ (if no computer is connected to all others) or to $\{1, \dots, 5\}$ (if no computer is isolated from all others). Either way, two of the computers must have the same number of connections.

6.5 #20. Following the hint, same as the number of solutions in integers ≥ 0 to

$$x_1 + x_2 + x_3 + x_4 = 11,$$

or $\binom{11+4-1}{11} = \binom{14}{11}$

6.5 #22. This is the number of solutions to $x_1 + \dots + x_6 = 12$, or

$$\binom{12+6-1}{12} = \binom{17}{12}$$

6.5 #24 $\binom{15}{1,2,3,4,5} = \frac{15!}{1! 2! 3! 4! 5!}$

6.5 #30 We are permuting the multiset $\{M^2, I^4, S^4, P^2\}$,
the number of ways is

$$\binom{11}{1, 4, 4, 2} = \frac{11!}{4! 4! 2! 1!}$$

6.5 #42 $\binom{52}{13, 13, 13, 13} = \frac{52!}{(13!)^4}$.