ECE 369

Homework 4: Combinatorics

Problem I

$$(3x-5)^4 = C(4,0)(3x)^4 + C(4,1)(3x)^3(-5) + C(4,2)(3x)^2(-5)^2$$
$$+ C(4,3)(3x)(-5)^3 + C(4,4)(-5)^4$$
$$= (81x^4) + 4(27x^3)(-5) + 6(9x^2)(25) + 4(3x)(-125)$$
$$+(625)$$

Coefficient of x: $4*3*(-125)$

$$= \boxed{-1500}$$

Problem II

The match could go for three, four, or five games.
These cases are all disjoint.

1) 3 games: A A A   or   B B B

             2 ways

2) 4 games: The winning team (which can be A or B)
    must lose one of the first 3 games.   Ex: A B A A

             $2 * C(3,1) = 6$ ways.

3) 5 games: The winning team (which can be A or B)
    must lose two of the first 4 games.   Ex: A B B A A

             $2 * C(4,2) = 12$ ways

∴ The total # win-loss scenarios is

$$2 + 6 + 12 = \boxed{20}$$