The last extra problem on HW4

(i) $\#(S) = (52)(51)$

(ii) $\#(A) = (13)(12)$

$$P(A) = \frac{(13)(12)}{(52)(51)} = \left(\frac{13}{52}\right)\left(\frac{12}{51}\right)$$

= the same answer you got with unordered pairs

The reason for this

#(unordered pairs) = $\frac{1}{2}$ #(ordered pairs)
so you divide both the numerator and denominator by 2 so NO NET CHANGE

This is tricky
you have one less choice since you have used up a card

$\#(B) = (51)(13)$

$$P(B) = \frac{(51)(13)}{(52)(51)} = \frac{13}{52} = \frac{1}{4}$$

so $P(B) = P(\heartsuit \text{ on } 2^{nd}) = \frac{1}{4} = P(\heartsuit \text{ on } 1^{st})$

Finally we get

$$P(\heartsuit \text{ on } 1^{st} \mid \heartsuit \text{ on } 2^{nd}) = \frac{P(A \cap B)}{P(B)}$$

$$= \frac{P(\heartsuit\heartsuit)}{P(\heartsuit \text{ on } 2^{nd})} = \frac{\left(\frac{13}{52}\right)\left(\frac{12}{51}\right)}{\left(\frac{13}{52}\right)}$$

$$= \frac{12}{51}$$

$$= P(\heartsuit \text{ on } 2^{nd} \mid \heartsuit \text{ on } 1^{st})$$

It is much easier to do this problem using Bayes' Theorem.