Dan Baum Math 475 Quiz 9/13/10

$A = \{1,2,3,4,5\}$ How many permutations of A are there in which 1 and 2 are not next to each other?

Count the complement, where 1 and 2 are next to each other:
There are 4! permutations of $\{\langle 1,2\rangle, 3,4,5\}$
and multiply by 2 to include $\{\langle 2,1\rangle, 3,4,5\}$
for $2 \cdot 4!$ "invalid" permutations.

The total number of permutations of A is 5!

So the number of valid permutations is $5! - 2 \cdot 4!$
$= 5 \cdot 4! - 2 \cdot 4! = 3 \cdot 4! = \boxed{72}$