Name: _____

Directions: Show all work. No credit for answers without work.

1. The house special of Joe's sandwich shop features a choice of 8 different toppings.

    (a) [**3 points**] Assuming no restrictions on the toppings, how many ways are there to order the house special?

    (b) [**2 points**] Now, suppose that 4 of the toppings are *premium* toppings and the other 4 are *regular* toppings. There are no restrictions on the number of regular toppings that can be ordered, but at most 1 premium topping can be ordered. (Of course, it is possible to order the house special with no premium toppings.) Now how many ways are there to order the house special?

2. ATM Pin numbers

    (a) [**3 points**] How many 4-digit ATM pin numbers do not contain a 5?

    (b) [**2 points**] How many 4-digit ATM pin numbers have a 5 in at least one position? For example, 5512 and 5555 are OK but 1234 is not.