## Math 10B, Quiz 2

Instructions: For the first question, make sure to show your work and explain your answer. For the final three questions, you do not need to show any work, but you will receive -1 points for an incorrect answer.

1. (12 points) How many ways are there to arrange the letters $a, b, c, d, e$, and $f$ such that $a$ is not directly followed by either $b$ or $c$ ? (For example 'abdefc' and 'acdefb' are both not valid, but 'adbcef' is valid.)
2. (1 point) When using inclusion-exclusion to find the size of the union of 5 sets, you need to subtract the size of the triple intersections.True $\square$ False
3. (1 point) The number of nine digit numbers that start with the digit 3 is greater than the number of nine digit numbers in which no digit is repeated.
$\bigcirc$ True $\bigcirc$ False
4. (1 point) On an exam, a question asks "How many strings of 5 letters are there that contain the letter ' $z$ ' exactly three times?" One student gives the answer $1 \cdot 1 \cdot 1 \cdot 25 \cdot 25$, reasoning that the three ones are for the three z's and the two 25 's are for the other two spots, each of which can be any letter besides z . The student is:

Ondercounting (i.e. their answer is too small)
O Correct
Overcounting (i.e. their answer is too large)

