CS2223 D Term 2020 Quiz 6

(1 point) Question 1: "My brain is open. . . ."
I pledge that I am taking this quiz on my own, with help from no one else and no notes:

(3 points) Question 2: A National League baseball team consists of 25 players.
A batting order from such a team consists of an ordered subset of 9 of the players.
How many batting orders are possible?

a.) $2^9 = 512$
b.) $9! = 362,880$
c.) $C(25,9) = \frac{25!}{9!16!} = 2,042,975$
d.) $2^{25} = 33,554,432$
e.) $P(25,9) = \frac{25!}{16!} = 741,354,768,000$

(3 points) Question 3: Generating Subsets

Each choice below represents all the subsets of $\{a, b, c\}$.
Which of them is in **squashed order**?

a.)	$\emptyset$,	$\{1\}$,	$\{2\}$,	$\{3\}$,	$\{1,2\}$,	$\{1,3\}$,	$\{2,3\}$,	$\{1,2,3\}$
b.)	$\emptyset$,	$\{1\}$,	$\{2\}$,	$\{3\}$,	$\{2,1\}$,	$\{3,1\}$,	$\{3,2\}$,	$\{3,2,1\}$
c.)	$\emptyset$,	$\{1\}$,	$\{2\}$,	$\{1,2\}$,	$\{3\}$,	$\{1,3\}$,	$\{2,3\}$,	$\{1,2,3\}$
d.)	$\{1,2,3\}$,	$\{1,2\}$,	$\{1,3\}$,	$\{2,3\}$,	$\{1\}$,	$\{2\}$,	$\{3\}$,	$\emptyset$
e.)	$\{3,2,1\}$,	$\{2,1\}$,	$\{3,1\}$,	$\{3,2\}$,	$\{3\}$,	$\{2\}$,	$\{1\}$,	$\emptyset$

(3 points) Question 4: Minimal-Change Requirement

Suppose we wish to generate all $5^5 = 3,125$ arrangements of the digits 0 through 4, i.e. 00000 up to 44444, and we insist on applying the minimal-change requirement (perhaps as a 5-ary Gray code rather than a binary/Boolean one).
Which of the following might appear in our list after the arrangement 01234?

a.) 01240
b.) 10000
c.) 10234
d.) 11234
e.) 12340

(1 point) Bonus Question: Binary Reflective Gray Codes
The follow is an interesting fact about our Binary Reflective Gray Code (BRGC):

a.) Zero and One are the only integers with the same representations in Base Two and in our Binary Reflective Gray Code.

b.) Unlike in Base Two, an integer is even if and only if its BRGC representation has an even number of 1s.

c.) Powers of 2 larger than $2^0 = 1$ can be expressed with exactly one 1 in Base Two but require exactly two 1s in our BRGC.

d.) As in Base Two, the length of the BRGC representation of a positive integer k can be computed as $\lceil \lg k \rceil + 1$, that is $\lceil \log_2 k \rceil + 1$

e.) All of the Above