# COMP 2121
**DISCRETE MATHEMATICS**

# Quiz 1

Name:

Student ID:

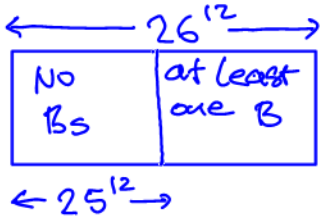
Set: A B C D (circle one)

- *Time allowed: 20 min.*

**1.** A typical PIN (personal identification number) is a sequence of 12 letters chosen from the 26 letters in the alphabet.

- Repetition is allowed unless otherwise stated.

(a) [1 mark] How many PINs have at least one letter B?




$26^{12} - 25^{12}$

(b) [1 mark] How many PINs have exactly **three** letters B and exactly **two** letters C?

$\frac{12!}{3!2!7!}$ BBBCC_____ $24^7$

__C__C_B_BB_ $24^7$

____CC_B__B_B $24^7$

$\frac{12!}{3!2!7!}(24)^7$

OR use combinations

$\binom{12}{3}\binom{9}{2}\cdot(24)^7$

same; select pos. for 3 B's; select pos. for 2 C's; the rest

(c) [1 mark] How many PINs with exactly **two** X's, exactly **one** Y, and exactly **one** Z do not have them adjacent in any way?

any arrangement of 8 digits (no x, y, z) → WAACABWT $23^8$

select any 4 positions → ^W^A^A^C^A^B^W^T^ $\binom{9}{4}$

arrange x, x, y, z over 4 spots → ^W^A^A^C^A^B^W^T^ (X Y Z X) $\frac{4!}{2!}$

$\binom{9}{4}\cdot(23)^8\cdot\frac{4!}{2!}$

**2.** [2 marks] What value does a variable *counter* have after the following code execution?

Do not simplify the expression.

```
counter = 100

for i = 1 to n {

      counter = 7

}


for j = 1 to 4n {

            for k = j + 1 to 4n + 15 {

                  counter = counter + 8
            }

            counter = counter + 9
}

// assume n ≥ 1
```

reset to 7

gap: pairs never made

4n+1, 4n+2, ..., 4n+5

$$\text{counter} = 7 + \left[\binom{4n+15}{2} - \binom{15}{2}\right](8) + (4n)(9)$$