

## MAT 258

## Quiz 1

May 21, 2021

1. How many bit strings are there of length 7?

- a)  $2^7$                       b)  $7^2$                       c)  $3^7$                       d)  $7^3$                       e) 72

Correct Answer:  $2^7$

2. How many bit strings of length 7 have exactly 3 one's?

- a) 21                      b) 35                      c) 36                      d) 45                      e) 40

Correct Answer: 35

3. How many bit strings of length 7 have less than 3 one's?

- a) 39                      b) 34                      c) 44                      d) 20                      e) 29

Correct Answer: 29

4. How many onto functions are there from the set  $X = \{A, B, C\}$  to the set  $Y = \{1, 2, 3\}$ ? Recall: a function is onto if every  $y \in Y$  has an  $x \in X$  with  $f(x) = y$ .

- a) 4                      b) 3                      c) 53                      d) 6                      e) 7

Correct Answer: 6

5. In how many different ways can four team members be assigned to the roles of producer, designer, developer, and tester on their game?

- a) 36                      b) 15                      c) 16                      d) 25                      e) 24

Correct Answer: 24

6. In how many different ways can four students, from a class of ten, be assigned to the roles of producer, designer, developer, and tester on in order to form a game team?

- a)  $10 \cdot 9 \cdot 8$                       b)  $\frac{10!}{6!}$                       c) 1500                      d)  $6!$                       e)  $\binom{10}{6}$

Correct Answer:  $\frac{10!}{6!}$

7. How many license plates can be made with the following restrictions: There are 5 characters, the first three are numerals from 1 to 9 inclusive, the fourth is any uppercase letter, and the last is either a numeral from 1 through 9 inclusive or an uppercase letter.

- a)  $9^3 \cdot 26 \cdot 35$                       b)  $3^9 \cdot 9 \cdot 26^2$                       c)  $9^3 \cdot 35 \cdot 26^2$                       d)  $9 \cdot 3 \cdot 26 \cdot 35^2$                       e)  $9^4 \cdot 26^3$

Correct Answer:  $9^3 \cdot 26 \cdot 35$

8. Same as previous question but no letter or numeral can be repeated (ie. used twice anywhere in the string).

- a)  $9 \cdot 8 \cdot 7 \cdot 26^2 \cdot 35$                       b)  $9 \cdot 8 \cdot 26 \cdot 35$                       c)  $9 \cdot 8 \cdot 7 \cdot 26 \cdot 31$                       d)  $9^3 \cdot 26 \cdot 31$                       e)  $9 \cdot 8 \cdot 7 \cdot 57$

Correct Answer:  $9 \cdot 8 \cdot 7 \cdot 26 \cdot 31$

9. How many solutions are there to the equation  $x_1 + x_2 + x_3 + x_4 = 15$  with all  $x_i \geq 0$  integers?

- a) 832                      b) 812                      c) 826                      d) 816                      e) 806

Correct Answer: 816

10. How many ways are there to place 7 balls into 2 labelled boxes (say Box 1 and Box 2) if there are 2 red, and 5 green balls, and balls of the same color are indistinguishable?

- a) 21                      b) 42                      c) 18                      d) 27                      e) 35

Correct Answer: 18 (All answers received full credit, since this was quite tricky.)