

## 20 - Final Review 1

### Practice problems.

1. Convert  $A_{5_{16}}$  to base 10.
2. Convert  $A_{5_{16}}$  to ternary.
3. Convert HEX color code  $\#A4A5A6$  to its RGB value.
4. Compute  $\gcd(210, 77)$ .
5. Compute  $\gcd(1627025190, 95661615)$  given that the Euclidean algorithm produces the following first lines of computations:

$$\begin{aligned}1627025190 &= 17 \times 95661615 + 777735 \\95661615 &= 123 \times 777735 + 210\end{aligned}$$

6. Compute the positive remainder of the division  $N \div M$  where  $N = (25)^3 - 47 \cdot 48$ ,  $M = 21$ .
7. List the elements of the set  $(A \cup B) - (B \cap C)$  where  $A = \{1, 2, 3, a, b, c, d\}$ ,  $B = \{a, d, e, 1, 3, 5\}$ , and  $C = \{1, 2, 4, b, b, a\}$ .
8. Let  $U = \{a, b, c, d, e, f, g, h\}$  be the universe. List the elements of the set

$$(\sim \{a, c, e, g\}) - \{a, b, c, d\}$$

9. Let  $A = (0, 3)$  and  $B = [1, 2]$ . Graph the set  $A - (\sim B)$  on the number line.
10. Find the cardinality of the set  $\{7n : n \in \mathbb{Z}\} \cap [0, 91]$ .
11. Draw the Venn diagrams for  $A \cup B$ ,  $A \cap B$ ,  $\sim A$ ,  $A \cap (\sim B)$ ,  $A \cap B \cap (\sim C)$ ,  $(A \cup B) \cap C$ .
12. Let  $A$  and  $B$  be sets within the universe  $U$  with  $|B| = 12$ ,  $|A \cap B| = 4$ ,  $|U| = 40$ , and  $|A - B| = 18$ .

- **Part A.** Find  $|A|$ .
- **Part B.** Find  $|\sim A|$ .
- **Part C.** Find  $|\sim B|$ .
- **Part D.** Find  $|A \cup B|$ .
- **Part E.** Find  $|B - A|$ .

13. A marketing script scraped **500** posts from a tech conference.

- **200** posts use the hashtag **#AI**.
- **250** posts use the hashtag **#Robotics**.
- **100** posts use **neither**.

**Part A.** How many scraped posts mention both of these topics?

**Part B.** How many scraped posts mention **#AI** but not **#Robotics**?

**Part C.** How many scraped posts mention **#Robotics** but not **#AI**?

**Part D.** How many scraped posts mention exactly one of these topics?