

Name: \_\_\_\_\_

Please show all work and justify your answers.

1. Expand decimal 357 in binary, octal and hexadecimal. What is the decimal expansion of hexadecimal FAB?
2. Prove that a positive integer is divisible by 5 if and only if the sum of the digits in its hexadecimal expansion is divisible by 5.
3. Apply the extended Euclidean algorithm to find  $\gcd(252, 198)$  and the Bézout coefficients.
4. Use the Chinese remainder theorem to solve the following system of congruences:

$$x \equiv 2 \pmod{5}, \quad 6x \equiv 5 \pmod{7}, \quad 7x \equiv 3 \pmod{8}.$$

1	2	3	4	total (40)