

You may use a calculator. You may **NOT** use any books or notes. Please write full solutions, not just answers. **Show your work, explain your reasoning**, and cross out anything I should ignore when grading. This midterm has 6 questions, for a total of 100 points. Good luck!

	1	2	3	4	5	6	Total
	15 pts	15 pts	15 pts	20 pts	15 pts	20 pts	100 pts
Score							

- (15 points) For each of the congruences below, find all solutions (if any).
  - $927x \equiv 4 \pmod{102}$
  - $928x \equiv 4 \pmod{102}$
- (15 points) An Japanese tourist returning home from a trip to Europe and U.S. exchanges his Euro and Dollar bills for yens. If he receives 15,286 yen, and received 112 yen for each Euro and 122 for each U.S. Dollar, and he had more Dollars than Euros, how many of each type of currency did he exchange ?
- (15 points) What is the smallest natural number  $n$  such that

$$\begin{aligned}n &\equiv 1 \pmod{3} \\n &\equiv 3 \pmod{8} \\n &\equiv 2 \pmod{5}\end{aligned}$$

- (10 points) What is the last digit in the decimal representation of  $7^{19522}$ ?
  - (10 points) Find all the solutions to the congruence

$$x^2 + x \equiv 0 \pmod{437} \quad (437 = 23 * 19)$$

- (15 points) Find at least one solution to the following congruence:

$$x^2 - 3x - 7 \equiv 0 \pmod{27}$$

- (10 points) Determine if the following ISBN number is valid:

$$0 - 404 - 50874 - 9$$

- (10 points) While copying the ISBN for a book, a clerk accidentally transposed two digits. If the clerk copied the ISBN as 0-07-289095-0 and did not make any other mistakes, what is the correct ISBN for the book ?