

Math 208, Handout XI: Review Problems for the Final Exam

To prepare for the final exam, you may wish to study the problems in this handout, the problems in all previous handouts, the assigned homework problems, the book, and your lecture notes. The final exam will be comprehensive with an emphasis on chapters 25 through 30. You may *not* use calculators during the exam.

1. Find the remainders when 3546545375085674360038405540404471243 is divided by each of the following numbers: 2, 5, 10, 20, 100, 250, and 500.
2. Determine n between 0 and 17 such that $997^{362} \equiv n \pmod{18}$
3. Determine n between 0 and 49 such that $370540305540347 + 20402025025017 \equiv n \pmod{50}$.
4. Determine n between 0 and 49 such that $954358805540309 * 76922025025020 \equiv n \pmod{50}$.
5. Find all integer solutions to $91x + 14y = 36$.
6. Find all integer solutions to $91x + 14y = 35$.
7. Solve each of the following congruences:
 - (a) $4x \equiv 2 \pmod{6}$
 - (b) $3x \equiv 5 \pmod{7}$
 - (c) $4x \equiv 6 \pmod{9}$
8. Convert each of the following numbers to decimal: $1101\ 0001_2$, $10EC_{16}$, and 305_8 .
9. Convert the decimal integer 42965 to base 16.
10. Convert the decimal integer 491 to base 8.
11. Convert the decimal integer 76 to binary (i.e. to base 2).
12. A restaurant offers three types of sandwiches, four types of fruits, and six types of beverages. If a combination meal consists of one sandwich, one piece of fruit, and one beverage, how many combination meals are possible?
13. How many seven-letter words contain exactly two A's?
14. How many seven-letter words contain exactly one A and one B? (For example, ACDBXYZ contains exactly one A and one B. Find the number of words that are like this.)
15. The combination on a combination lock consists of three nonnegative integers. These integers must be distinct and less than 65. How many combinations are possible?
16. Five men, four women, and three children are to be arranged in a row. Suppose that the men must sit together, the women must sit together, and the children must sit together. How many arrangements are possible?
17. Compute $(x + y)^5$.
18. Compute each of the following: (a) $\binom{7}{3}$, (b) $\binom{15}{2}$, and (c) $\binom{12}{3}$.