Problems

We begin this section with a sample of review problems. Most likely, these problems would have been extremely hard for you to do before this course began, but I hope that now they won't seem so bad.

1. If an item costs \$36.78, how much change would you get from \$100?

2. Do the mental subtraction problem: 1618 – 789.

Do the following multiplication problems.

3. 13×18

4. 65×65

5. 997×996

6. Is the number 72,534 a multiple of 11?

7. What is the remainder when you divide 72,534 by a multiple of 9?

8. Determine 23/7 to six decimal places.

9. If you multiply a 5-digit number beginning with 5 by a 6-digit number beginning with 6, then how many digits will be in the answer?

10. Estimate the square root of 70.

Do the following problems on paper and just write down the answer.

11. 509×325

12. $21{,}401 \div 9$

13. 34,567 ÷ 89

14. Use the phonetic code to memorize the following chemical elements: Aluminum is the 13^{th} element; copper is the 29^{th} element; and lead is the 82^{nd} element.

15. What day of the week was March 17, 2000?

16. Compute 212^2.

17. Why must the cube root of a 4-, 5-, or 6-digit number be a 2-digit number?

Find the cube roots of the following numbers.

18. 12,167

19. 357,911

20. 175,616

21. 205,379

The next few problems will allow us to find the cube root when the original number is the cube of a 3-digit number. We'll first build up some ideas to find the cube root of 17,173,512, which is the cube of a 3-digit number.

22. Why must the first digit of the answer be 2?

23. Why must the last digit of the answer be 8?

24. How can we quickly tell that 17,173,512 is a multiple of 9?

25. It follows that the 3-digit number must be a multiple of 3 (because if the 3-digit number was not a multiple of 3, then its cube could not be a multiple of 9). What middle digits would result in the number 2_8 being a multiple of 3? There are three possibilities.

26. Use estimation to choose which of the three possibilities is most reasonable.

Using the steps above, we can do cube roots of any 3-digit cubes. The first digit can be determined by looking at the millions digits (the numbers before the first comma); the last digit can be determined by looking at the last digit of the cube; the middle digit can be determined through digit sums and estimation. There will always be three or four possibilities for the middle digit; they can be determined using the following observations, which you should verify.

27. Verify that if the digit sum of a number is 3, 6, or 9, then its cube will have digit sum 9.

28. Verify that if the digit sum of a number is 1, 4, or 7, then its cube will have digit sum 1.

29. Verify that if the digit sum of a number is 2, 5, or 8, then its cube will have digit sum 8.

Using these ideas, determine the 3-digit number that produces the cubes below.

30. Find the cube root of 212,776,173.

31. Find the cube root of 374,805,361.

32. Find the cube root of 4,410,944.

Compute the following 5-digit squares in your head!

33. $11{,}235^2$

34. $56{,}753^2$

35. $82{,}682^2$

Solutions for this lecture begin on page 142.