

Problem Set 1

The first three problems are problems that everybody should do. Solutions will be posted on our website later this week. Don't wait until the solutions are up to try them! Ready?

1. Your favorite band of all time is coming out with a new CD. It is going to have 12 songs on it. You buy the CD, and you put it on shuffle on your iTunes. Your iTunes is smart, and it won't play one song again until all 12 songs have been played. How many ways can the CD be played?

2. You wish to create a 10-character password that alphanumeric and *not* case-sensitive. Use the addition principle to find how many passwords either begin with the letter A or B.

3. At a dessert stand, you get to create your own ice cream sundae. The different types of ice cream are strawberry, chocolate, and vanilla; the different types of toppings are peanut butter, cherry, and whipped cream; you're also allowed to have it in either a cup or a cone. How many sundaes can you make that have one scoop and one topping? Don't forget to take into account the size!

These are the group-specific problems. Next week, you will discuss your answers with your group and select one person to present his or her solution to the class. Correct solutions will earn your group points toward a prize at the end of the course! If you need help, I'd be willing to offer modest hints by e-mail.

1. John commutes to work from his house by bicycle. No matter what route he ends up taking, he always must pass the same two landmarks in the same order: the Prudential building, and the John Hancock building. Assume that there are three paths between John's house and the Prudential, two paths between the Prudential and the John Hancock, and then another four paths between the John Hancock and work. How many routes can John take to work? With your answer, please construct some type of picture to justify your reasoning. Count the number of paths and verify that your answer is correct.

2. Look at Problem 2 from the first section. Is it necessary to use the addition principle? If it is necessary, explain why no other rule we have yet learned would suffice. If it is not necessary, apply another rule we've learned and verify that you get the same answer.

3. There is a group of twelve people in a room. How many ways can you arrange them in a circular fashion? Hint: Careful; this is tricky. Consider arranging the twelve people in a linear fashion, and try to figure out what the difference is! For example, if I had three people, ABC, what can you say about the linear arrangements ABC, BCA, and CAB if they were arranged circularly? You may find the subtraction principle helpful.