MATHEMATICAL INTRODUCTION

This is a mathematical way to introduce a group of around 20 people. Have around 8 sit in a tight circle facing outward. Have the remaining 12 stand in a circle around the inner core circle facing in. Now have everyone close their eyes and stick their hands into the area over the heads of the people who are sitting. Everyone should then randomly grab two hands (not their own). At this point one person will start the introductions; he or she will say their name (and possibly some extra information), and then squeeze one of the hands that they are holding; when someone else feels someone squeeze their hand, they will say their name, and then squeeze their other hand. If the first person's second hand is squeezed before everyone has been introduced, someone who has not been introduced starts the process introducing-squeezing process again.

A nice way to tweak this is to have the first person pass the end of a rope to the hand that he squeezes. This person then passes the end across their chest to the next person, while everyone keeps hold on to the hands that they grabbed, and the first person keeps fingers around the rope. A new rope can be started with each starting person. When this is finished, the ropes will be tied in the same link that the people are tied in.

(1) What is the probability of having just one loop (starting person) at the end, if the initial group has 7 people? 20 people? N people?
(2) What does PIE have to do with the answer to the previous question?
(3) How can Taylor's theorem be used to simplify the computation?
(4) What is the probability of k loops forming when this process is started with N people?