Decision Sciences 1, Session 7
An in-class case study

Ms. Arianne works for Wizards Realty, a real estate company in the city of Hogsmeade. She is looking for a buyer for a property, and from a recent advertisement given in the Daily Prophet, 152 potential clients have shown interest to buy it. To plan an open house, Ms. Arianne has asked the potential clients if they will be interested to see the property in person, and a total of 30 clients have confirmed their interest. From her prior experience though, Ms. Arianne knows that only about 20% of these people are likely to show up for the open house. She, however, keeps everyone informed about the schedule and usually 5% of the clients who do not confirm their interest prior to the open house also pay a visit.

Organizing this open house would cost Ms. Arianne $500, but she has seen that those who come for the open house are usually 50% likely to make an offer. Irrespective of whether it eventually ends up in a sale, Ms. Arianne gets an incentive from the company for every such offer. The amount of incentive depends on the offer from the buyer, and typically can be approximated by a normal distribution with mean $400 and standard deviation $100.

The objective of this case study is to evaluate whether this open house is a good idea for Ms. Arianne. For that, answer the following questions.

   (a) What is the chance that none of the 30 clients who confirmed their interest would actually come for the open house?
   (b) What is the chance that exactly one client, among all, would come for the open house?
   (c) If exactly two clients come for the open house, what is the expected net gain for her?
   (d) If it is known that exactly one potential client came for the open house, how likely is it for Ms. Arianne to not suffer any loss?
   (e) How many clients should come for the open house to make it a suitable plan for Ms. Arianne? You may consider various aspects in this answer, such as how many should confirm their interests a priori, what can be the likelihood of someone making an offer even if they do not come for the open house, etc.