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Prompt:

We would like to target some subset of the huge number of visitors to our main retail web page with a new special offer. Instead of the normal early May special offer of a discounted flower bouquet for Mom, we've decided to offer select customers a 30% discount on any electric razor purchase from our stock.

3.1

Intro

For either offer, we can consider the costs and the benefits.

The costs to display an offer are effectively zero, so let's consider that portion 0. This implies that we will show every visitor one of the offers (unless we predict that showing them an offer will drive them away from the site, which we believe to be unlikely). The cost of the visitor taking the special offer (vs. buying at retail price) is the discount amount of the offer, times, of course, the quantity they bought at that discount. (Let's assume the quantity for either offer is capped at 1, to keep things simple.)

The benefit of a visitor taking an offer has two components: the profit (or loss) due to the sale of the offered good (at the discounted price), plus the profit we can earn from add-on or future sales. The former could be positive, zero, or negative, in the case that we discount such that we expect the offer to be a loss-leader. The latter, let's assume, is positive.

Generally speaking, we want to choose the offer that has the highest expected net benefit, be it from them purchasing the offered product, or from this motivating them to purchase other goods, or both.

For either offer, we will predict several probabilities: the probability of the person taking the offer at that discounted price, and the probability of the person making other purchases *given* that the visitor has been offered a bouquet.

Our expected value calculation would look like:

$$E$$