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Dear IMC:

Millions of people and businesses complete Internal Revenue Service tax forms each year. Through the IRS, the United States Government collects billions of dollars. This money is used to pay for the multitude of services that residents of the United States expect: health care, roads, bridges, unemployment insurance, disaster relief, defense, ect.

In 2008, the IRS processed over 130 million tax returns. Most of these returns were individual tax returns. The large majority of these individual returns received a refund due to overpayment of taxes. In 2008, 85.6% of individual returns received a refund.

Most US taxpayers would probably agree that tax forms are overly complex. Because of this complexity, a huge number of mathematical errors are made. Some errors benefit the taxpayer. Some errors benefit the government. Other errors are not so naïve. Each year, taxpayers intentionally underreport their income to avoid paying their taxes. This underreporting leads to billions of dollars of nonpayment of taxes.

To insure that each taxpayer pays their fair share of taxes, the IRS examines a small percentage of returns to check their accuracy. Some taxpayers have a higher likelihood of having their tax return examined. In the past few years, tax payers with higher incomes have been targeted for examination. Taxpayers claiming a home office deduction have also been subject to closer scrutiny.

The publicity surrounding who is targeted appears in the media each year around April 15, the deadline for filing tax returns. Many taxpayers feel their likelihood of being examined has less to do with income or deductions and more to do with whether they request a refund or not. To test this notion, we have discovered the data below at the IRS website (www.irs.gov):

Year	Examined (%)	Refund (%)	Number Examined Resulting in Refund	Number Examined Resulting in No Refund
2000	0.49	72.2	37,079	580,686
2001	0.58	83.5	29,362	702,394
2002	0.57	82.0	31,772	712,109
2003	0.65	97.0	38,457	810,839
2004	0.77	81.6	43,788	964,086
2005	0.93	81.4	48,444	1,116,864
2006	0.97	81.7	39,986	1,243,964
2007	1.03	85.1	49,225	1,335,338
2008	1.01	85.6	49,907	1,341,674

The key question to answer is this: If a taxpayer is to receive a refund, what is the likelihood that the taxpayer's return will be examined? How does this likelihood compare when the taxpayer is not to receive a refund? How has this likelihood changed over time? To answer this last question, you should use the data in the year you have been assigned and in 2008.

Please document your solution to this problem in a technical memo. I have taken several college math classes, but I am not completely familiar with the content in your class. Make sure you define exactly what the problems is as well as the events, theorems and techniques you use in your solution strategy. Please show the numbers you use to do your calculations. Based on what you write, I should be able to apply your strategy to determine how the likelihood has changed between any two years in the table. A scientific expert (your instructor) is available to answer any questions that you might have in the course of your investigations. This expert will not be available to assist on this project over the weekend before it is due. You should plan on consulting with this expert as soon as possible if you are unclear on any of the requirements of this project.

Benji Franklin
Executive Director