One Possible Solution to Out of Class Problem 1
For EDL 7150—Inferential Statistics

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First, you should note that I did not have you read my paper on probability just for your enjoyment. I expected you to read it carefully, think about it, work through the examples I included in the paper, and then approach the problem from a probability standpoint. The few suggested solutions I've received show no evidence of having attended to the paper.

The Poisson Probability Distribution would seem to provide the best fit for this problem, since we want to know the probabilities of 6 absences in Jan '13 and 8 absences in Feb '13, given the average (or expected) rates of absenteeism, for those months, over the previous 9 years (2003-04 through 2011-12). The averages (rates) for each month are given in the second row of the table below. The number of absences, for each month in 2012-13, are given in row 3.

Average Rates or Absenteeism, by month, over the years 2003-04 Through 2011-12

Ave Absenteeism	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
Years 2003-2012	2.50	2.70	3.30	3.20	3.22	3.67	2.22	2.33	2.00
Absenteeism in 2012-2013	2	3	4	4	6	8			
Poisson Prob.	0.713	0.506	0.42	0.397	0.108	0.034			
Change in Prob. From Prev.		0.207	0.086	0.023	0.289	0.074			

The easiest way to compute the Poisson Probabilities is to use the Poisson Calculator provided in Stat Trek. The Poisson Probabilities are given in Row 4 of the table. The fifth row of the table gives the change in Poisson Probability for a given year from the previous year.

We can note that for the months, Sep through December, the 2014-2013 probabilities of absenteeism are quite reasonable, i.e., they are well within a reasonable level of chance. For example, for November, given previous year's data, we should expect to see four teacher absences about 40 percent of the time. For January, on the other hand, an absentee rate of 6 would be expected, by chance, only about 10 percent of the time. Whether this should be considered problematical is a call the principal would have to make. For February, however, an absence rate of 8 would be expected by chance only 3% of the time. This seems too low a

chance occurrence. Something must be going on. Even though absenteeism is historically higher during January and February, than for the other months, the higher rates of absences for January, and especially February appear unusual.

Another way of attacking the problem is to consider absenteeism during January and February together. Then, under an assumption of random occurrence, ask, "What is the probability of the number of absences observed for January and February in 2012-13." This, again, is easily answered using the Poisson Probability Distribution. The table in the box to the right provides the relevant information. The Combined column gives the sum of the absences for January and February for each year. The average combined rates of absence from 2003-04 through 2011-12 is 6.89. We want to know the probability of 14 combined absences in 2012-13.

Year	January, February Combined
2003-04	8
2004-05	8
2005-06	6
2006-07	5
2007-08	7
2008-09	7
2009-10	6
2010-11	8
2011-12	7
2012-13	14
Average over years 2003-2012	6.89
Poisson Probability	0.011

Using the Poisson Calculator with 14 as the Random variable (x) and 6.89 as the average rate of absenteeism over the previous nine years, we get a Poisson Probability of .011. Fourteen absences is unlikely a chance occurrence, given the pattern of absenteeism over the previous nine years. The principal probably should investigate the causes.

If you did not even come close to the solutions given here, you should re-read the Probability paper. You should also consider raising questions when you have trouble understanding things in this class.