Problem 3: Consider the data given in problem 2 and 3 for the National Foods. The firm can hire the noted sport's pundit Jim Worden to give his opinion as to whether or not the Super Bowl game will be interesting. Suppose the following probabilities hold for Jim's predictions:

P (Jim predicts game will be interesting | game is dull) = .15

P (Jim predicts game will be interesting | game is average = .25

P (Jim predicts game will be interesting | game is above average = .50

P (Jim predicts game will be interesting | game is exciting = .80

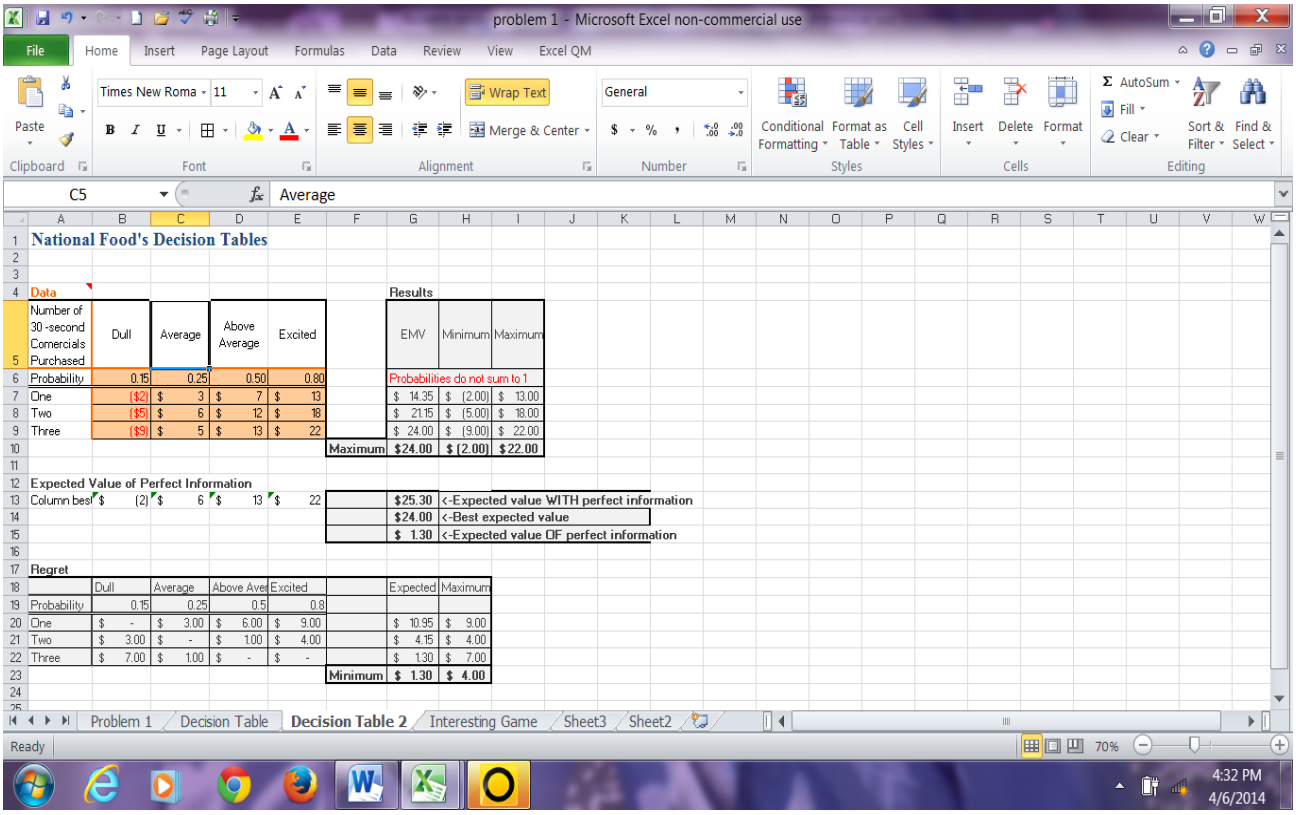
P (Jim predicts game will not be interesting | game is actually dull) = .85

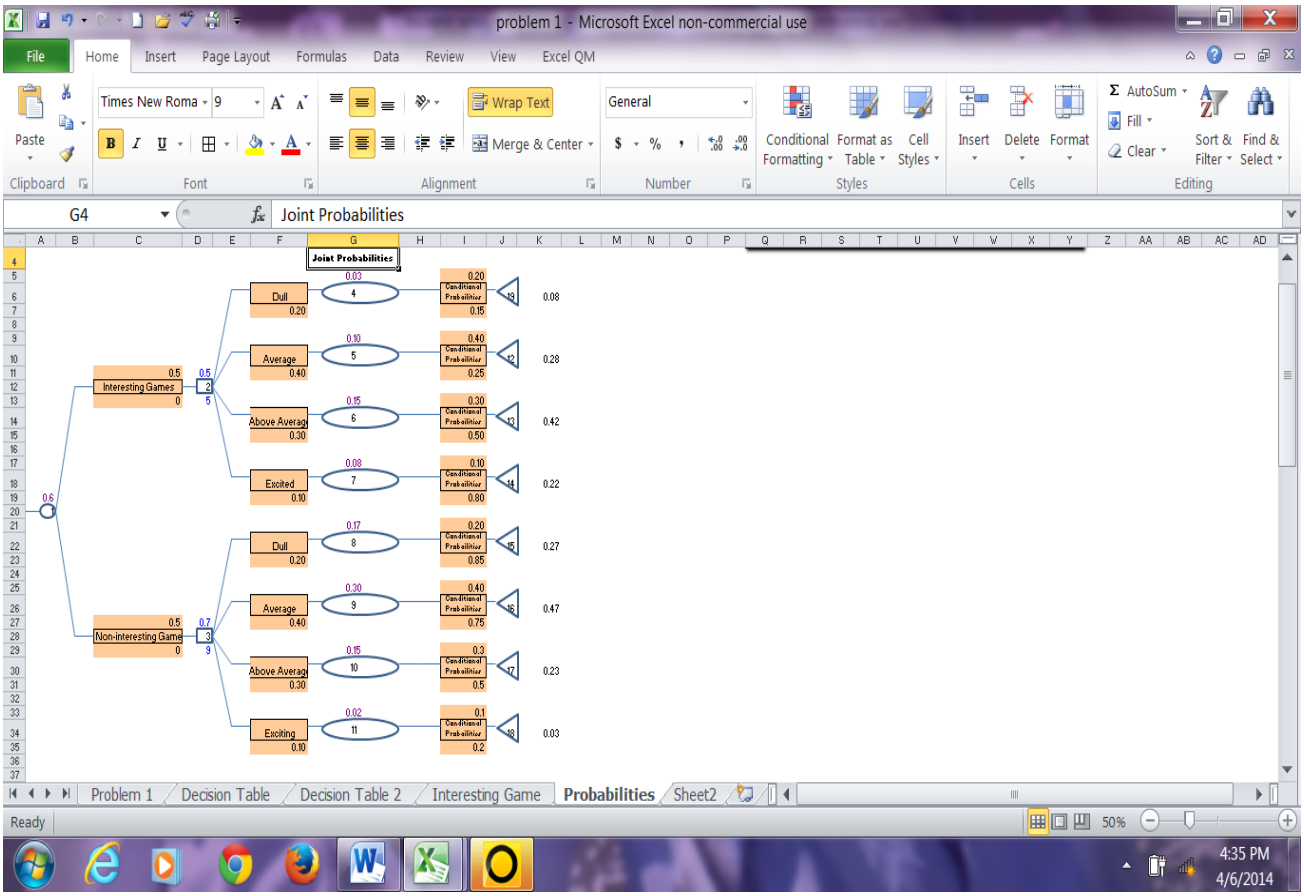
P (Jim predicts game will not be interesting | game is average) = .75

P (Jim predicts game will not be interesting | game is above average) = .50

P (Jim predicts game will not be interesting | game is exciting) = .20

(You may graph a decision tree, in order to makes the problem transparent)

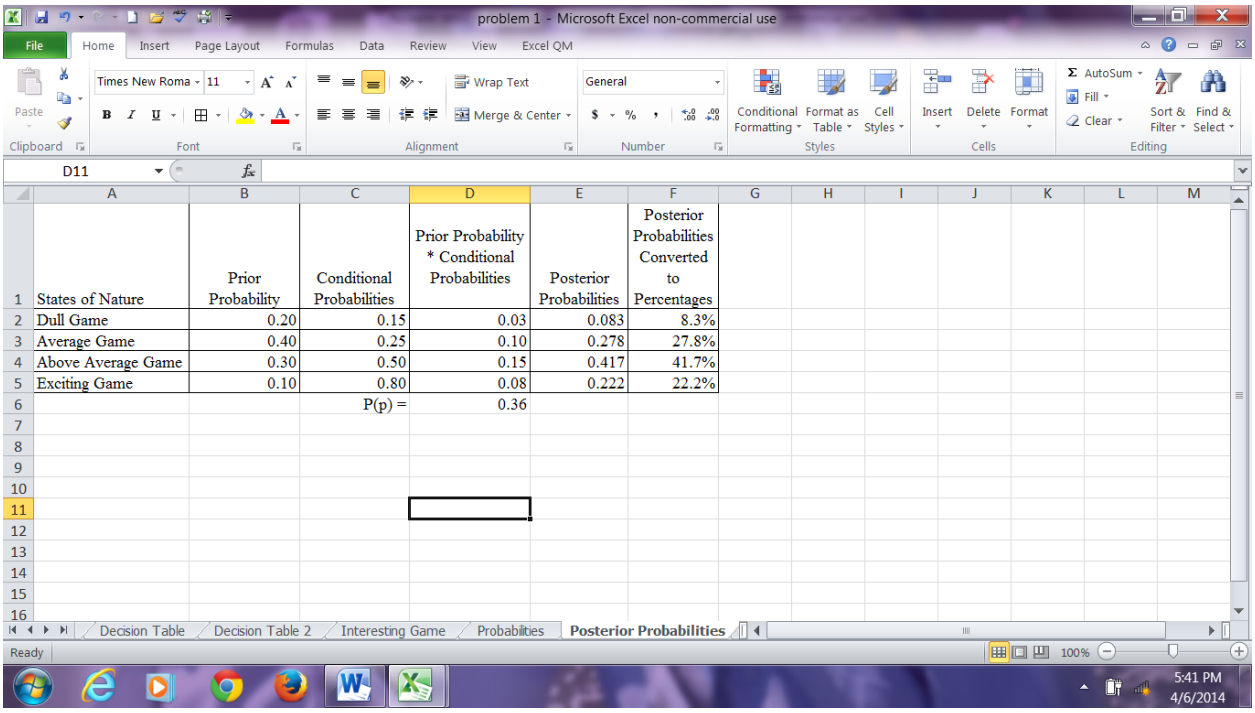




a. Jim predict the game will be interesting, what is the If probability the game will be dull?

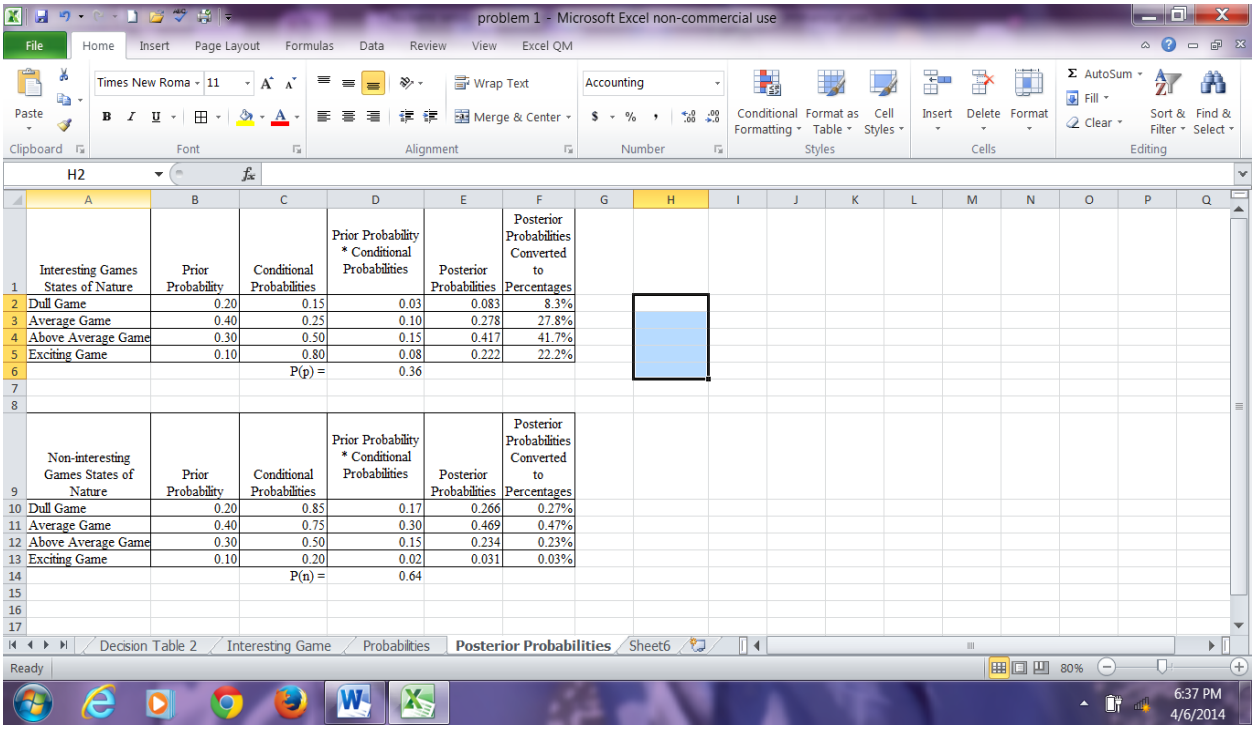
If Jim predicted that game would be interesting, IF probability that the game will be dull 8.3%.

(Prior probability) .20 * (Conditional probability) .15 = .03
.03 + .10 + .15 + .08 = .36 (the sum of all of the prior probability * conditional probability)
.03/.36 = .083 converted into a percent is 8.3%



	A	B	C	D	E	F
1	States of Nature	Prior Probability	Conditional Probabilities	Prior Probability * Conditional Probabilities	Posterior Probabilities	Posterior Probabilities Converted to Percentages
2	Dull Game	0.20	0.15	0.03	0.083	8.3%
3	Average Game	0.40	0.25	0.10	0.278	27.8%
4	Above Average Game	0.30	0.50	0.15	0.417	41.7%
5	Exciting Game	0.10	0.80	0.08	0.222	22.2%
6			P(p) =	0.36		

b. What is the national's strategy if Jim predicts the game will be (i) Interesting or (ii) not interesting?



	A	B	C	D	E	F
1	Interesting Games States of Nature	Prior Probability	Conditional Probabilities	Prior Probability * Conditional Probabilities	Posterior Probabilities	Posterior Probabilities Converted to Percentages
2	Dull Game	0.20	0.15	0.03	0.083	8.3%
3	Average Game	0.40	0.25	0.10	0.278	27.8%
4	Above Average Game	0.30	0.50	0.15	0.417	41.7%
5	Exciting Game	0.10	0.80	0.08	0.222	22.2%
6			P(p) =	0.36		
7						
8						
9	Non-interesting Games States of Nature	Prior Probability	Conditional Probabilities	Prior Probability * Conditional Probabilities	Posterior Probabilities	Posterior Probabilities Converted to Percentages
10	Dull Game	0.20	0.85	0.17	0.266	0.27%
11	Average Game	0.40	0.75	0.30	0.469	0.47%
12	Above Average Game	0.30	0.50	0.15	0.234	0.23%
13	Exciting Game	0.10	0.20	0.02	0.031	0.03%
14			P(n) =	0.64		

One interesting -> .083 * (2) + 0.278 * 3 + 0.417 * 7 + 0.222 * 13 = $6.47
Two interesting -> .083 * (5) + 0.278 * 6 + 0.417 * 12 + 0.222 * 18 = $10.25
Three interesting -> .083 * (9) + 0.278 * 5 + 0.417 * 13 + 0.222 * 22 = $10.95

(i) If Jim predicts that the game will be interesting, then they should purchase three commercials.

One non-interesting -> 0.266 * (2) + 0.469 * 3 + 0.234 * 7 + 0.031 * 13 = $2.92
Two non-interesting -> 0.266 * (5) + 0.469 * 6 + 0.234 * 12 + 0.031 * 18 = $4.85
Three non-interesting -> 0.266 * (9) + 0.469 * 5 + 0.234 * 13 + 0.031 * 22 = $3.68

(ii) If Jim predicts that the game will not be interesting, then they should purchase two commercials.

c. What is expected value of Jim's information?

EV(strategy per page 564 in the text)
P(p) 0.36*10.95 + P(n) 0.64*4.85 = $7.05
EVSI = EV with information – EV without information (per page 566)
EVSI = 7.05 – 6.80 (at 3 commercials in earlier analysis) = $0.25
