Midterm 2

1. (*10 points*) The price of computers has decreased by about 1% a year in the last seven years. If inflation has been 2% a year, calculate the annual rate at which computer prices have changed in inflation-adjusted terms.

A: 0.99=1.02*(1+d_R). Hence d_R=-2.9%.

2. *(15 points)* The city of San Francisco spends $1m every year repainting the golden gate bridge. You have developed a paint that lasts twice as long. If the city were to switch to your new type of paint, how much would the city be willing to spend for each repainting? Assume the city uses a real discount rate of d_R=4% and a rate of inflation f=2%.

A: 1m+1m/1.04=1.96m.

3. (*20 points*) You are buying a Prius for $25,000 with a 5 year loan of 5 annual payments (the first payment being a year from today) with an interest rate *i*. Then, at the end of year 5, you will sell the car. A five year-old Prius is currently selling for $13,000. Your gas consumption is about 100 gallons a year. The current cost of gas is $4/gallon. You expect the car to need maintenance costs once, 3 years from today. The current cost for this maintenance is around $500. You expect the inflation rate to be *f*. Draw the real and actual cashflow diagram leaving the amounts as formulas (either algebraic or Excel).

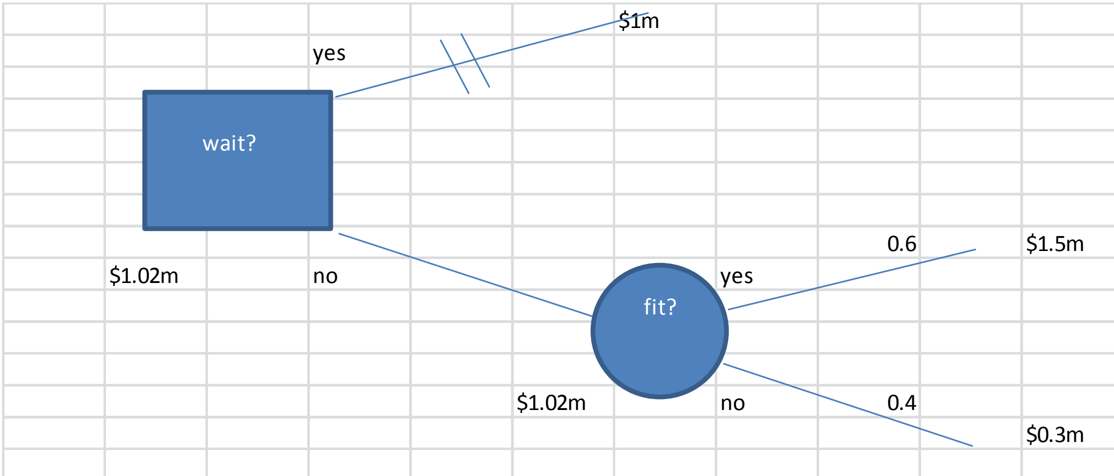
A: Loan payment is A$ C=PMT(i,5,-25000). Yearly gas cost is 100*4=400.
So, year 1: A$ -(C+400*(1+f)) or R$ -(C*(1+f)^(-1)+400)
Year 2: A$ -(C+400*(1+f)^2) or R$ -(C*(1+f)^(-2)+400)
Year 3: A$ -(C+900*(1+f)^3) or R$ -(C*(1+f)^(-3)+900)
Year 4: A$ -(C+400*(1+f)^4) or R$ -(C*(1+f)^(-4)+400)
Year 5: A$ 12,600*(1+f)^5 - C or R$ 12,600 - C*(1+f)^(-5).

4. Your company manufactures iPhone cases. There are rumors that Apple will introduce the iPhone 5 in March. If you wait until the phone is announced to develop cases that fit it, you expect to make a profit of $1m. If you make cases based on the rumors then there is a 60% chance that you make $1.5m in profit because you will be able to sell your cases before your competitors. However, there is a 40% chance that your cases won't fit and you will need to redevelop your cases after the phone is announced, giving you an expected profit of only $300k.

a) (*15 points*) Construct the decision tree. Make sure to label the nodes. Don't forget the probabilities.

b) (*10 points*) Solve the decision tree. Make sure to prune the sub-optimal branches and label each node with its payoff. (*Hint: there is no discounting in this problem.*)

A:



c) (*10 points*) Write a sentence mentioning the expected profit and explaining the optimal strategy.
A: The optimal strategy is to not wait, and the expected profit is $1.02m

d) You are considering paying a reward of $100k for more accurate information about the phone's dimensions. How accurate must the information be (i.e., with what probability will the cases fit), for this to be worthwhile? Construct the tree (*10 points*), solve it (*5 points*), and write a sentence explaining the solution (*5 points*).

A:
1.4p+0.2(1-p) >=1.02
➔ p >=0.683
The information given should result in at least 68.3% chance of the case fitting the iphone.