Next week's lab prep: watch the video tutorial on the Joules to Dollars web page for creating an Excel worksheet to calculate a loan payment schedule for financing a new car and create your own spreadsheet template and email it to yourself as a backup

Lab assignment: construct a loan payment schedule for financing the purchase of a $150,000 home using a 30-year mortgage of equal monthly payments and a fixed nominal interest rate of 4% to answer the following questions

1. How much total interest will you have paid on this mortgage at the end of 30 years?

2. Suppose you make one extra payment per year on the principal of the loan, spread out over the entire year (e.g., if your monthly payment was $600, recalculate your financinc schedule with a payment of an additional $50/month so that over the course of the year you have paid an additional $600, i.e., your monthly payment is $650). What happens to the total amount of interest you would now pay on this loan and the number of months before the mortgage is paid off?

3. Suppose instead that after 10 years of dutifully paying your mortgage, interest rates fall to 2%. The bank will let you refinance the remaining 20 years on your mortgage at the lower rate, but you must pay a fee (a.k.a. "closing costs") of $1,000. Should you refinance your mortgage? Justify your answer carefully and completely with the appropriate calculations.

Note that: $$Payment = Principal \times \left(\frac{r^e}{1-(1+r^e)^{-n}}\right)$$

where r^e is the "effective" interest rate, i.e., the nominal rate divided by the compounding period; for monthly payments $r^e = {}^{r}/_{12}$

n is the number of payments

Useful Excel formulas to 'dress up' your worksheet:

Calculating the loan payment: =PMT(r^e,term,principal)
where "term" is the number of months you are financing the loan and
"principal"is the amount borrowed

You can decompose your loan payment into an
(1) an interest payment: =IPMT(r^e,period,term,principal)
where "period" is the payment period you want to calculate the interest for
(1 ≤ period ≤ term)
and
(2) a principal payment: =PPMT(r^e,period,term,principal)