Math 180 Homework #11
Due Friday, December 13

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1. A lottery winner is offered one of two payment options:

   - ten annual payments of $\$50,000$, starting today
   - a lump sum of $\$400,000$, offered today

   Assuming you can invest money with guaranteed 4% interest (compounded annually), which payment option has the highest present-day value?

   Hint: For $r \neq 1$, $1 + r + r^2 + \cdots + r^{n-1} = \dfrac{1 - r^n}{1 - r}$

2. A certain company's stock is currently worth \$1 per share. You wish to setup an option to purchase 1000 stocks for \$1000 in two months. Assume:

   - Each month, the stock's value either increases by 3%, or decreases by 2%
   - One can loan money from the bank at a rate of 2% per month

   (a) What is the initial price of the stock option (we are assuming that the option will be sold with no intention of profit)?

   (b) What should the initial hedge portfolio consist of (how many shares should you initially purchase, and how much should you borrow from the bank)?

   (c) If the stock goes up after 1 month, how should you adjust the portfolio?